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ABSTRACT

Nutrition is well-recognized as a necessary component of educational programs for physicians. This is to be valued in that of all factors affecting health in the United States, none is more important than nutrition. This can be argued from various perspectives, including health promotion, disease prevention, and therapeutic management. In all cases, serious consideration of nutrition related issues in the practice is seen to be one means to achieve cost-effective medical care. These modules were designed to provide more practical knowledge for health care providers, and in particular primary care physicians. Because diet is the cornerstone of diabetic treatment, this module is designed to help physicians to understand the basic principles of the diabetic diet and be able to plan with the patient a suitable diet which the patient can follow. Included are the learning goals and objectives, self-checks of achievement with regard to goals, and references for the physician and for the physician to give to the patient. The appendices include "Exchange Lists for Meal Planning," a supplementary exchange list, and a fast food exchange list. (CW)

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10 Dietary Management in Diabetes Mellitus

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Nutrition in Primary Care

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Columbus, Ohio 43210

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10 Dietary Management in Diabetes Mellitus

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10 Dietary Management in Diabetes Mellitus

Tables and Figures

Table 10–1 Effect of Insulin on Carbohydrate, Protein, and Fat Utilization in the Liver, Muscle, and Adipose Tissue **2**

Table 10–2 Height-Weight Table of Desirable Weights **5**

Table 10–3 Insulin, Oral Hypoglycemic Agents, and Recommended Carbohydrate Distribution **9**

Table 10–4 ADA Exchange Lists and Nutrient Content **11**

Table 10–5 Meal Plan for Diabetic Patient **13**

Table 10–6 Kilocalorie Content, Carbohydrate Content, and Exchanges for Various Alcoholic Beverages **15**

Table 10–7 Supplementary Exchange List **44**

Table 10–8 Fast Food Exchanges **50**

Figure 10–1 Metabolic Derangements Resulting from Insulin Deficiency **3**

Figure 10–2 Nomogram for Estimating Caloric Needs **6**

Introduction

During your practice as a physician, you will have innumerable contacts with diabetic patients. It has been estimated that there are approximately 3.5 to 4 million persons in the United States who have diabetes mellitus. In addition to the 200,000 to 300,000 new cases diagnosed each year, the National Health Survey estimates that another 40% of cases are undiagnosed. Family practice physicians reported in the 1976 Virginia Study that diabetes mellitus was the seventh most frequent reason why patients visited family practitioners' offices.

Diet, with or without insulin, is the cornerstone of diabetic treatment. The diet prescription for the patient with diabetes mellitus must be translated into a diet pattern acceptable to the patient. The diet must also be nutritionally adequate and maintain, insofar as possible, normal blood glucose levels throughout the 24 hour day. The diet should also promote a desirable weight status in the adult and normal growth and development in the child and adolescent.

Goals

Because diet is the cornerstone of diabetic treatment, you must understand the basic principles of the diabetic diet and be able to plan with the patient a suitable diet which the patient can follow. Therefore, as a result of this unit of study, you should be able to:

1. *Determine the ideal body weight of the patient, given the patient's height and using both the Hamwi formula and the modified Fogarty Center "desirable weight table";*

2. *Given the patient's height and weight, estimate the caloric requirement of the patient using both the nomogram and the formula provided in the module, taking into consideration the patient's ideal body weight, activity level, and any period of increased energy need such as pregnancy, growth, surgery, or fever; and*

3. *Apply the principles of the diabetic diet in planning a diet which is suitable for a diabetic patient. A case study is presented in which you can plan a diabetic diet using the American Diabetes Association (ADA) exchange system and taking into consideration the patient's caloric requirement, typical diet history, and the use of insulin.*

Review of Diabetes Mellitus

The metabolic defect of diabetes mellitus, an insufficient secretion of insulin, causes disturbances in carbohydrate, protein, and fat metabolism. Juvenile-onset (insulin-dependent) diabetics produce little or no insulin, and therefore they require an exogenous source. Adult-onset (ketosis-resistant) diabetics usually produce some insulin and may or may not require insulin injections.

Diabetes mellitus is a disorder in blood sugar regulation in which the beta cells of the pancreas produce an insufficient supply of insulin. The defect may be an abnormality of (1) secretion, (2) effect on peripheral receptors of insulin, or (3) both. Diabetes mellitus is characterized by disturbances of carbohydrate, protein, and fat homeostasis and by macroangiopathic, microangiopathic, and neuropathic changes. The metabolic effects of insulin are reviewed in Table 10–1.

When not enough insulin is available to the cells, glucose cannot enter muscle or fat cells. With inadequate insulin, metabolic derangements of diabetes occur and can result in diabetic ketoacidosis through the progression of events as shown in Figure 10–1.

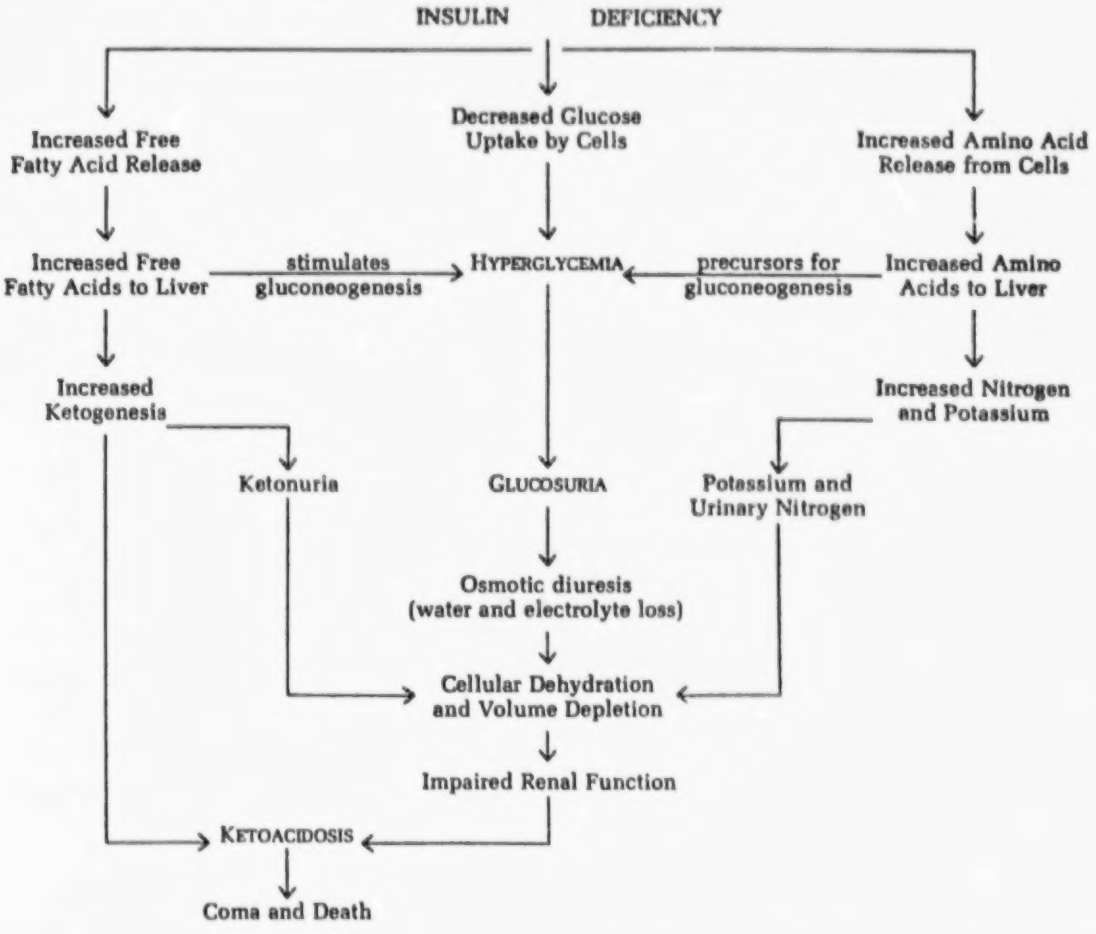
Juvenile (or growth-onset) type, insulin-dependent (or ketosis-prone) diabetes is more commonly seen in the young, but it may occur in adults as well. These patients produce little or no insulin, and without exogenous insulin injected daily, ketosis will develop.[2]

In the adult, or maturity-onset, ketosis-resistant diabetic patient, some insulin is produced, perhaps even an excessive amount such as that which occurs in the overweight diabetic. In the overweight diabetic, however, insulin secretion may be delayed in response to glucose challenge, or there may be peripheral resistance to the action of insulin by the muscle and adipose tissue cells. This down-regulation of receptors is probably a key factor in maturity-onset diabetes. Postprandial hyperglycemia is common in these patients and may be the only symptom occurring; these patients frequently have minimal symptoms. Ketosis-resistant diabetes may also be seen

Table 10–1 Effect of Insulin on Carbohydrate, Protein, and Fat Utilization in the Liver, Muscle, and Adipose Tissue

	Liver	Muscle	Adipose Tissue
Carbohydrate	↑ Glycogenesis ↑ Glycolysis ↓ Glycogenolysis ↓ Gluconeogenesis	↑ Glucose uptake ↑ Glycogenesis ↑ Glycolysis	↑ Glucose uptake ↑ Lipogenesis
Protein	↑ Protein anabolism ↓ Proteolysis	↑ Amino acid uptake ↑ Protein anabolism ↓ Proteolysis	No Effect
Fat	↑ Lipogenesis ↓ Lipolysis ↓ B-oxidation	↓ Fatty acid uptake ↓ B-oxidation	↑ Fatty acid synthesis ↑ Lipogenesis ↓ Lipolysis

Figure 10–1 Metabolic Derangements Resulting from Insulin Deficiency



Tepperman, J.: *Metabolic and Endrocrine Physiology*, 3rd ed., Chicago: Year Book Medical Publishers, 1973. Used with permission of Year Book Medical Publishers, © 1973, Chicago, IL and J.B. Lippincott Co., © 1976, Philadelphia, PA.

in a young person; when this occurs, it is usually called maturity-onset diabetes in youth.[3]

The concept of peripheral resistance to insulin is attractive and the subject of much research. It appears that resistance means that there are diminished numbers of receptors to insulin at the cell level in the dependent, or adult-onset, diabetic. This may be from obesity or lack of exercise. In contrast, the insulin-dependent diabetics have increased receptors which can explain their sensitivity to small amounts of insulin. Dr. Jesse Roth presents an excellent review of this topic in *Hospital Practice*, May, 1980.[4]

The ketosis-resistant diabetic may require insulin if obese or during periods of stress. Examples of the occurrence of stress are following a myocardial infarction or cerebral vascular accident, during pregnancy or an infection, after surgery or other trauma, or while being treated with steroid therapy. Otherwise, the ketosis-resistant diabetic may be controlled with diet plus hypoglycemic agents or preferably by diet alone.

Goals of Diet Therapy for the Patient With Diabetes Mellitus

Proper dietary management is the most important factor in the practical treatment of diabetes mellitus. To permit the patient with diabetes mellitus to lead a normal life in good health is the principal objective of treatment. The treatment program should be designed to correct defects in metabolism, preserve pancreatic function, prevent chronic diabetic complications, and promote psychosocial adjustment.

Diet, oral hypoglycemic agents or insulin, and exercise are the major modalities used in the treatment of diabetes mellitus. The nutritional requirements for the diabetic patient are basically the same as for all individuals. However, due to the diabetic patient's metabolic disorder and treatment, a few nutritional modifications are necessary. Goals for dietary treatment of the diabetic patient include the following:

- Regulate blood sugar to as near normal as possible.
- Promote desirable weight status in the adult and normal growth and development in the child and adolescent.
- Supply adequate amounts of all nutrients — carbohydrate, protein, fat, vitamins, minerals, and fluid.
- Prevent or delay the long-term complications of diabetes.
- Satisfy the patient's desire for pleasurable meals, and improve the patient's feeling of well-being.

In the obese adult-onset diabetic, the single most important goal is to attain and maintain a desirable body weight.

Achievement of this goal may be associated with the reduction or disappearance of the requirement for exogenous insulin, improvement or correction of fasting hyperglycemia and glucose intolerance, and reduction of known risk factors for atherosclerotic vascular disease, such as obesity, hypertension, hyperlipidemia, and hyperglycemia.[6]

There is a sharp controversy among physicians as to the best method of treating the diabetic patient. One group of physicians and nutritionists adheres to the belief that high blood glucose and glucosuria contribute to the onset of severe vascular disease in diabetics. Therefore, these physicians and nutritionists attempt to regulate blood glucose levels within normal limits and keep the urine free of glucose. Such strict control requires the use of a weighed diet, urine testing throughout the day, and adjustment of insulin dosage or oral agents as necessary.

On the other hand, another school of thought contends that careful regulation does not delay the onset of vascular disease. These physicians and nutritionists advocate maintaining blood glucose levels within the realm of permitting glucosuria, but without ketonuria and weight loss. Diet for this less-rigid control is unmeasured or "free," restricting only sucrose and foods high in sucrose. These physicians and nutritionists believe this approach allows the patient to live a more normal and satisfying life. Although research is conflicting, there is strong support for the contention that chronic hyperglycemia is a causative factor in cardiovascular complications.

A third group advocates the middle-of-the-road approach. This approach uses the exchange method of diet planning which is somewhat liberal yet accurate because it is based on weighed quantities of foods allowed on the diabetic diet. Most physicians and nutritionists practice this moderate approach. An appropriate goal is to achieve a fasting blood glucose below 150 milligrams/deciliter and a near-normal body weight. This is the approach we recommend although rigorous control could be beneficial to those patients who can manage such a program.

Writing the Dietary Prescription

In writing an appropriate dietary prescription for a diabetic patient, the following four steps are suggested and discussed:

1. Determine acceptable body weight and kilocalorie prescription.
2. Consider special needs.
3. Calculate the proportion of nutrients as carbohydrate, protein, and fat.
4. Consider meal spacing depending on treatment — type of insulin, oral agent, or diet alone.

Determine Acceptable Body Weight and Kilocalorie Prescription

To determine desirable body weight, the modified Fogarty Center acceptable weight table or the Hamwi formula may be used. To determine kilocalorie prescription a nomogram, or a simple formula, may appropriately be used.

Diabetics should be encouraged to maintain a weight status slightly below acceptable weight. Use of the modified Fogarty Center height-weight table (see Table 10–2) is appropriate for determining acceptable weight.

Table 10–2 Height-Weight Table of Desirable Weights

Height*		MEN Weight (lb)*			WOMEN Weight (lb)*		
Ft	in	Average	Acceptable weight		Average	Acceptable weight	
4	10				102	92	119
4	11				104	94	122
5	0				107	96	125
5	1				110	99	128
5	2	123	112	141	113	102	131
5	3	127	115	144	116	105	134
5	4	130	118	148	120	108	138
5	5	133	121	152	123	111	142
5	6	136	124	156	128	114	146
5	7	140	128	161	132	118	150
5	8	145	132	166	136	122	154
5	9	149	136	170	140	126	158
5	10	153	140	174	144	130	163
5	11	158	144	179	148	134	168
6	0	162	148	184	152	138	173
6	1	166	152	189			
6	2	171	156	194			
6	3	176	160	199			
6	4	181	164	204			

*Height without shoes, weight without clothes.

Reproduced with permission from Bray, G.A.: "Obesity," in Dowling, H.F., et al. (eds.), *Disease-A-Month*, © 1979, by Year Book Medical Publishers, Inc., Chicago. (Adapted from the recommendations of the Fogarty Center Conference, 1973.)

To determine the ideal or desirable body weight according to the Hamwi method, the following two formulas are employed:

For the Female: 100 pounds is allocated for the first 5 feet plus 5 pounds for each inch over 5 feet. For example: a 5 feet 4 inch tall woman should weigh 120 pounds (100 + [4 × 5] = 120) plus or minus 5 pounds, therefore a desirable weight range is 115 to 125 pounds.

For the Male: 106 pounds is allocated for the first 5 feet plus 6 pounds for each inch over 5 feet. For example: a 6 feet 2 inch tall man should weigh 190 pounds (106 + [14 × 6] = 190) plus or minus 5 pounds, therefore a desirable weight range is 185 to 195 pounds.

Body build must also be considered in determining an ideal weight. A patient with a large frame should have 10% added to ideal body weight, whereas a person with a small frame should have 10% subtracted from ideal body weight.

After ideal body weight is calculated, an appropriate caloric requirement can be estimated by using two simple methods. First, the nomogram shown in Figure 10–2 can be used as directed to calculate kilocalories appropriate for the diet prescription. If weight loss is desired, an intake of 500 kilocalories per day less than expended should result in approximately a 1 pound weight loss per week following initial and rapid water loss. This 500 kilocalorie level should be subtracted from the figure obtained from Scale VII on the nomogram to appropriately prescribe a weight reduction diet.

A second simple, but not as accurate, way to establish the kilocalorie prescription level is to use the following formulas:

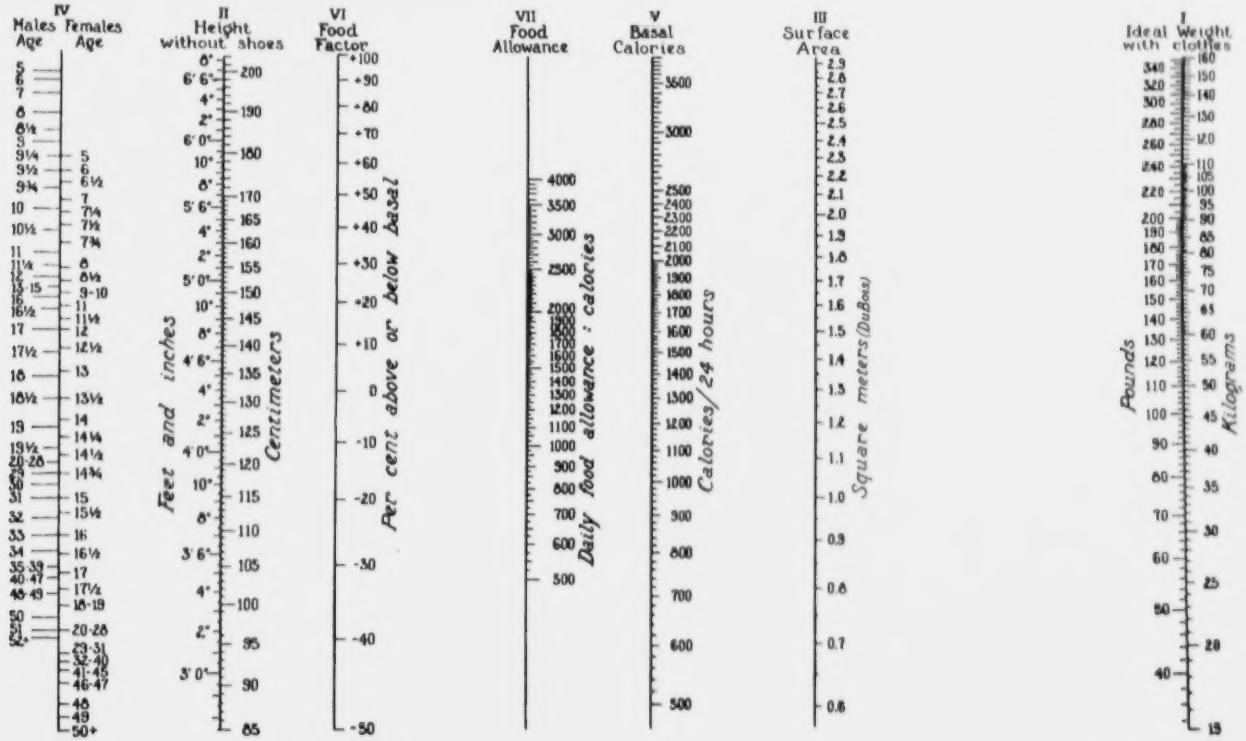
Kilocalories to lose weight = 10 kilocalories × desirable body weight (in pounds)

Kilocalories to maintain weight = 15 kilocalories × desirable body weight (in pounds)

Kilocalories to gain weight = 20 kilocalories × desirable body weight (in pounds)

For example: Given a 5 feet 4 inch tall woman who weighs 150 pounds and has a desirable body weight of 115 to 125 pounds, a 1,200 kilocalorie weight reduction diet should be prescribed (1,200 kilocalories = 10 kilocalories per pound × 120 pounds desirable body weight).

Figure 10–2 Nomogram for Estimating Caloric Needs



Directions for Estimating Caloric Requirement: To determine the desired allowance of calories, proceed as follows: 1. Locate the ideal weight on Column I by means of a common pin. 2. Bring edge of one end of a 12 or 15-inch ruler against the pin. 3. Swing the other end of the ruler to the patient's height on Column II. 4. Transfer the pin to the point where the ruler crosses Column III. 5. Hold the ruler against the pin in Column III. 6. Swing the left hand end of the ruler to the patient's sex and age (measured from last birthday) given in Column IV (these positions correspond to the Mayo Clinic's metabolism standards for age and sex). 7. Transfer the pin to the point where the ruler crosses Column V. This gives the basal caloric requirement (basal calories) of the patient for 24 hours and represents the calories required by the fasting patient when resting in bed. 8. To provide the extra calories for activity and work, the basal calories are increased by a percentage. To the basal calories for adults add: 50 to 80 per cent for manual laborers, 30 to 40 per cent for light work or 10 to 20 per cent for restricted activity such as resting in a room or in bed. To the basal calories for children add 50 to 100 per cent for children ages 5 to 15 years. This computation may be done by simple arithmetic or by the use of Columns VI and VII. If the latter method is chosen, locate the "per cent above or below basal" desired in Column VI. By means of the ruler connect this point with the pin on Column V. Transfer the pin to the point where the ruler crosses Column VII. This represents the calories estimated to be required by the patient.

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Consider Special Needs

The diabetic woman and her infant can survive a successful pregnancy, but the diabetic condition must be managed carefully. Caloric intake should be 30 kilocalories multiplied by weight in kilograms. At least 200 grams of carbohydrate should be included daily to prevent ketosis, and the meal plan should be divided into 3 meals and 3 snacks.

Special needs such as pregnancy or stresses associated with surgery, illness, or other hypermetabolic conditions affect the diet prescription for the diabetic.

Today's pregnant diabetic has a much improved chance of delivering a healthy infant than she did only a few years ago. Meticulous control of diabetes is essential during pregnancy. As the woman progresses through the pregnancy, her insulin requirement increases steadily and then drops suddenly after delivery to pre-pregnancy levels. In addition to perhaps several insulin injections daily and blood sugar monitoring at home, the diet must be carefully planned during pregnancy to provide for optimal nutrition and control of blood sugar, especially avoiding periods of ketosis which appear to increase the chance of birth defects.

As in the non-diabetic pregnant woman, a 25-pound weight gain in the pregnant diabetic is considered desirable. Remember that pregnancy is not the time to advocate weight reduction. The diet should provide about 30 kilocalories per kilogram of actual body weight and at least 200 grams of carbohydrate to prevent ketosis. Approximately 45% of the kilocalorie intake should be from carbohydrates. The intake of protein should be about 1.5 to 2.0 grams per kilogram body weight, or about 100 to 120 grams daily. Dietary fat should provide the remainder of the kilocalories.[7] The daily intake should be divided into 3 meals and 3 snacks, with strict avoidance of concentrated sweets.

During periods of stress, such as surgery, the diabetic needs extra protein and extra kilocalories to spare protein from being used for energy. An increased amount of insulin or the use of insulin in place of an oral hypoglycemic agent may be necessary to prevent hyperglycemia, secondary to both stress and the increased caloric intake consumed by the patient at this time. At times, however, such as before and after surgery, the diabetic needs less insulin if food intake is not allowed.

Calculate Proportion of Nutrients as Carbohydrate, Protein, and Fat

A new theory in dietary treatment of the diabetic is to increase the carbohydrate content of the diet with a concomitant decrease in the fat content, especially saturated fat. Carbohydrate can be increased to 60% to 70% of the diet without increased insulin requirements if simple sugars are restricted and kilocalories are not increased.

The severe restriction of carbohydrate in the diabetic diet is now considered unnecessary. Carbohydrate can comprise 50%, with some investigators suggesting 60% to 70%, of the total kilocalories without increasing insulin requirement or serum triglycerides, so long as the total kilocalorie content of the diet is not increased and the additional carbohydrate is complex carbohydrate rather than simple sugar. Approximately 65% to 70% of the total carbohydrate should come from starches, and 25% to 30% from lactose, fructose, and sucrose occurring in milk, fruits, and vegetables.[8-10]

The hypoglycemic effect of increased fiber in the diabetic diet is of recent interest and may become an integral component of dietary treatment in the future.[11] Additional scientific evidence, however, is needed before promoting this approach.

Protein should comprise approximately 15% to 20% of the total kilocalories in the diet; the higher figure is especially important for the pregnant diabetic. Because much of the protein consumed by the diabetic may be converted to glucose via gluconeogenesis, a protein intake of approximately 1.0 to 1.5 grams per kilogram body weight is recommended. This is an important concept to remember when treating diabetics because protein acts as a latent source of glucose and can help to

regulate the blood sugar levels during periods of food deprivation, such as during an overnight fast. For diabetic patients with chronic renal failure, Kimmelstiel-Wilson disease, or other renal disorders, protein intake must be limited to what is tolerated with the necessary kilocalories supplied by complex carbohydrates.

Fat should supply approximately 30% of the total kilocalorie intake. It is frequently and prudently recommended, although not well proven, that saturated fat in the diet should be decreased and/or replaced with polyunsaturated fat for the purpose of preventing or delaying atherosclerosis, the incidence of which appears to be increased in the diabetic population. Probably the most important recommendation to the diabetic in an attempt to decrease the incidence of atherosclerosis or to delay its occurrence is to achieve an ideal body weight. In addition, when hyperlipidemia is present in the diabetic, usually Type IV hyperlipoproteinemia, carbohydrate intake should be reduced to 40% of the total kilocalorie intake, and, if blood cholesterol is elevated, dietary cholesterol should be restricted to approximately 300 milligrams daily.

Taking a hypothetical example, let us review how to calculate the amount of carbohydrate, protein, and fat to include in a diabetic diet. The correct proportion and total grams of carbohydrate, protein, and fat in an 1,800 kilocalorie sample diet should be as follows:

> Carbohydrate 50% of total kilocalories = 900 kilocalories or 225 grams carbohydrate (4 kilocalories per gram)
> Protein 20% of total kilocalories = 360 kilocalories or 90 grams of protein (4 kilocalories per gram)
> Fat 30% of total kilocalories = 540 kilocalories or 60 grams fat (9 kilocalories per gram)

Because the vitamin and mineral requirements of the diabetic patient appear to be the same as that of the non-diabetic, and the diabetic diet includes the same foods as the regular diet except for sucrose which contains neither vitamins nor minerals, a vitamin and mineral supplement is, therefore, not routinely needed on the diabetic diet. A daily multivitamin and mineral supplement, supplying 100% of the Recommended Dietary Allowances (RDA) should be prescribed if the kilocalorie needs of the diabetic patient are less than 1,200 kilocalories or if the patient has poorly controlled diabetes, infection, malabsorption, or other complications.

Diabetics with poorly controlled disease may develop deficits of water, sodium, potassium, and chloride. This is especially true when diuresis or excessive sweating occurs, such as in patients with diabetic ketoacidosis, diarrhea, and renal disease.

Consider Meal Spacing Based on Type of Insulin, Oral Agent, or Diet Alone

Near normalization of blood sugar can be achieved in diabetics by judicious use of insulin and/or careful spacing of meals. Patients should be instructed on how to compensate for increased exercise and delayed meals and how to recognize and treat hypoglycemic episodes.

In the insulin-dependent diabetic, special consideration must be given to medication, meal timing, food intake, and exercise in order to prevent wide swings in blood glucose levels. Depending on the type of insulin used, intake of dietary carbohydrate must be planned so that carbohydrate absorption coincides with peak action time of the insulin. Refer to Table 10–3 for the recommended carbohydrate distribution depending on the type of insulin used by the patient.

Current therapy for the juvenile-onset, ketosis-prone diabetic is to give 2 or more insulin injections daily in an attempt to maintain blood glucose levels as near normal as possible. The patient and family must be educated to include a bedtime snack with a good source of protein in order to prevent early morning hypoglycemia. Acceptable evening snacks, also appropriate for other snacks during the day, include milk and graham crackers, a meat or cheese sandwich, cheese and crackers, plain yogurt, hard-boiled eggs, fresh fruit, and many others. A particularly labile diabetic may be best controlled on a diet plan in which $\frac{3}{10}$ of the carbohydrate is given each at breakfast, lunch, dinner, and bedtime snack, and $\frac{1}{10}$ each for mid-morning and mid-afternoon snacks.

All patients receiving intermediate-acting insulin should include a mid-afternoon snack of 10 to

Table 10–3 Insulin, Oral Hypoglycemic Agents, and Recommended Carbohydrate Distribution

Type of Insulin	Action	Peak Activity (Hours)	Duration (Hours)	Recommended CHO Diatribution				
				Breakfast	Lunch	Snack	Dinner	Snack
Regular	Rapid	2–4	5–8	1/3	1/3		1/3	
NPH	Intermediate	8–12	20–30	2/7 2/8	2/7 2/8	 1/8	2/7 2/8	1/7 or 1/8
Protamine Zinc	Prolonged	16–24	24–36+	2/7 2/8	2/7 2/8	 1/8	2/7 2/8	1/7 or 1/8
Semilente	Rapid	2–4	12–16	1/5 2/7	2/5 2/7		2/5 2/7	or 1/7
Lente	Intermediate	8–12	20–30	2/7 2/8	2/7 2/8	 1/8	2/7 2/8	1/7 or 1/8
Ultralente	Prolonged	18–24	36+	2/7 2/8	2/7 2/8	 1/8	2/7 2/8	1/7 or 1/8

Type of Oral Agents	Pharmaceutical Name	Trade Name	Recommended CHO Distribution		
			Breakfast	Lunch	Dinner
Sulfonylureas	Tolbutamide Chlorpropamide Acetohexamide Tolazamide	Orinase Diabinese Dymelor Tolinase	1/3	1/3	1/3

From Seubert, S.A.: "Insulin and Oral Hypoglycemic Agents," *Nutrition and Human Metabolism: An Outline for Study.* Used with permission of Sally A. Seubert, © 1971, Dallas, TX.

20 grams of carbohydrate (equal to 1 slice of bread or ½ to 1 cup fruit juice, or 1 medium fruit). A source of protein may also be necessary to aid in normalizing blood glucose. Appropriate snacks could include one half of a meat or cheese sandwich (15 grams carbohydrate, 7 grams protein), 1 cup milk (12 grams carbohydrate, 8 grams protein), 1 small fruit and 1 hard-boiled egg (10 grams carbohydrate, 8 grams protein), 1 cup plain yogurt (12 grams carbohydrate, 8 grams protein), or others.

Even with the development and use of the continuous insulin injection device, control of blood glucose by diet and insulin is still required. However, attempts at using a liberal, low simple sugar "free diet" with children and a low simple sugar diet with adults are currently being studied in Columbus, Ohio.

If a diabetic patient is not receiving insulin but is controlled with oral agents or diet alone, diet is still the cornerstone of the treatment. This patient should divide his food intake evenly throughout 3 meals per day, consuming approximately one-third of the kilocalories and carbohydrate each at breakfast, lunch, and dinner.

All patients receiving insulin or oral agents should be taught how to recognize and treat insulin reactions. If hypoglycemia occurs, the patients should be taught to consume approximately 10 to 20 grams of simple sugar such as one-half roll of Life Savers candy, one-half cup sweetened carbonated beverage or fruit juice, or 2 Tablespoons sugar dissolved in one-half cup water. Instruct the patient to wait 10 to 15 minutes and, if the symptoms remain, consume another serving of simple sugars.

When an insulin-dependent diabetic finds himself in the common situation where a meal will be delayed for one or two hours, he should ingest 15 to 30 grams of carbohydrate to prevent hypoglycemia.[7] This could include 1 to 1½ cups fruit juice, 1 to 2 slices of bread or 2 to 4 (2½ inch square) graham crackers. If the evening meal is to be delayed for several hours, the patient should be instructed to eat his bedtime snack at the regular evening meal time and eat his evening meal allowance at the later hour.

If increased exercise is anticipated by the diabetic, it is usually recommended that the patient consume extra food instead of changing the insulin dosage. The diabetic patient should consume about 10 to 15 extra grams of carbohydrate per hour if engaging in moderate exercise (such as walking, sweeping, or cleaning). If the exercise is vigorous (such as running, or other vigorous sports), an additional 20 to 30 grams carbohydrate per hour should be consumed.[13]

The ketosis-prone diabetic frequently has difficulty maintaining normal blood glucose levels despite attempts to appropriately inject insulin and adhere to a well-planned, carbohydrate-controlled diet. The Somogyi effect, which frequently occurs in ketosis-prone diabetics who adhere to their diabetic diet, is best treated by a cutback in insulin instead of changing the diet.

Coping with diabetes in childhood presents a major challenge to both the family and child. Diabetic children tend to have impaired self-images and tend to be dependent, anxious, and hostile. An acute emotional episode, resulting in rage or extreme anxiety, can trigger epinephrine release which stimulates gluconeogenesis and results in hyperglycemia. Emotional stress in many children may be handled by food gorging or omitting insulin injections. When ketoacidosis episodes occur in children due to emotional stress, the family and child may need the help of a psychologist to promote the establishment of an environment conducive to the stabilization of the child's diabetes.

The American Diabetic Association Diet

The ADA Diet was developed to translate the diabetic dietary prescription into an easily understood meal plan. It allows for variability and increased control of the diet by the patient.

The ADA exchange system diet was developed in 1950 by a joint collaboration of the American Diabetes Association, the American Dietetic Association, and the Chronic Disease Program of the US Public Health Service. The main goal of these groups of health professionals was to translate the diabetic dietary prescription into an easily understood meal plan. In 1976 the ADA diet was revised to correspond to the emphasis on total fat restriction in the diabetic diet. The current ADA ex-

Table 10–4 ADA Exchange Lists and Nutrient Content

Food Lists	Serving Size	Kilocalories	Carbohydrate Grams	Protein Grams	Fat Grams
Milk	1 cup	80	12	8	0
Vegetable	1/2 cup	28	5	2	0
Fruit	varies	40	10	0	0
Bread	1 slice, 1 small roll, or muffin, 1/2 cup cooked pasta	70	15	2	0
Meat, low fat	1 ounce	55	0	7	3
Meat, medium fat	1 ounce	82	0	7	6
Meat, high fat	1 ounce	100	0	7	8
Fat	1 tsp butter, or margarine, 1 Tbsp salad dressing	45	0	0	5

change lists and their nutrient contents are included in Table 10–4.

Refer to Appendix A at the end of this module for a copy of the complete booklet entitled *Exchange List for Meal Planning*. This includes a variety of foods and the portions of each that can be counted as one "exchange" or serving within each food list. All foods within the same list have approximately the same content of kilocalories, carbohydrate, protein, and fat. However, content of vitamins and minerals varies among foods within each list.

Meal Planning Using Exchanges

With knowledge of (1) the total kilocalories, carbohydrate, protein, and fat desired in the diabetic diet, (2) the patient's food preferences, (3) the optimal spacing of food, and (4) the recommended carbohydrate distribution dictated by the type of insulin administered, an individualized meal plan for daily use can be devised.

After the dietary prescription is determined, an accurate diet history must be elicited from the patient. The data gathered about food practices should be the same information one would obtain on any patient on a modified diet. Information elicited should include "what," "when," "where," and "with whom" the patient usually eats. Because insulin-dependent patients must establish and maintain a consistent daily meal schedule, it is important to identify any weekend or day-off variation in eating practices. Information regarding snacks and food preparation methods is also vital.

After eliciting the patient's typical diet history, use the booklet in Appendix A to determine the number of servings from each of the exchange lists the patient typically eats and is willing to eat regularly. An attempt should be made to tailor the diet as closely as possible to the patient's established eating pattern and food preferences. *However, in the interest of good control of diabetes, some adjustments may be necessary.*

Using an example to illustrate how to use the food exchange system, let us take an overweight, 5 feet 7 inch man, ideal body weight 143 to 153 pounds (106 + [6 × 7] = 148 pounds) whose diet prescription is initially determined to be 1,500 kilocalories (148 pounds × 10 kilocalories per pound ideal body weight = 1,480 kilocalories). Using the recommendation that 50% of the total kilocalories should come from carbohydrate, 20% from protein, and 30% from fat, the following calculation into grams of these nutrients can be made:

Carbohydrate — 50% × 1,500 kilocalories = 750 kilocalories = 185 grams carbohydrate at 4 kilocalories per gram.

Protein — 20% × 1,500 kilocalories = 300 kilocalories = 75 grams protein at 4 kilocalories per gram.

Fat — 30% × 1,500 kilocalories = 450 kilocalories = 50 grams fat at 9 kilocalories per gram.

Using the booklet in Appendix A, next we must translate these figures into food groups to meet the prescription for kilocalories, carbohydrate (C), protein (P), and fat (F).

First, the Carbohydrate Calculation:

The following number of servings is only an example; when considered with the information that follows, a well-planned nutritionally balanced diet is obtained.

Food List and Number of Servings	C gm	P gm	F gm
Milk, skim, 2 servings	24	16	0
Fruit, 3 servings	30	0	0
Vegetable, 2 servings	10	4	0
Subtotal	64	20	0

The total carbohydrate from sources other than the bread-starch group is 64 grams. Next, subtract 64 grams from the total carbohydrate allowance of 185 grams leaving 121 grams to be obtained from the bread-starch group. Because one serving of bread-starch contains 15 grams of carbohydrate and 2 grams of protein, 8 bread-starch servings may be allowed.

	C gm	P gm	F gm
Starch, 8 servings	120	16	0
Subtotal	184	36	0

Second, the Protein Calculation:

Total protein from sources other than the meat group equals 36 grams. Subtract this from the total protein allowance of 75 grams, which equals 39 grams. Because one low-fat serving of meat equals 7 grams of protein and 3 grams of fat, five to six meat servings are allowed in this sample diet.

	C gm	P gm	F gm
Meat, lowfat, 6 servings	0	42	18
Subtotal*	184	78	18

Third, the Fat Calculation:

Total fat from sources other than the fat group equals 18 grams. Subtract 18 grams from the total fat allowance of 50 grams, which leaves 32 grams. Because one serving from the fat group equals 5 grams of fat, 7 fat servings may be allowed on the sample diet.

	C gm	P gm	F gm
Fat, 7 servings	0	0	35
Subtotal	184	78	53

To check to be sure that the sample diet contains approximately 1,500 kilocalories, the total grams of carbohydrate and protein should be multiplied by 4 (4 kilocalories per gram of carbohydrate and protein) and added to the number of grams of fat multiplied by 9 (9 kilocalories per gram of fat).

In this sample diet, therefore, 184 grams carbohydrate + 78 grams protein = 262 grams × 4 kilocalories per gram = 1,048 kilocalories + 53 grams fat × 9 kilocalories per gram = 477 kilocalories for a combined total of 1,525 kilocalories.

Next, the exchanges need to be divided throughout the day according to the amount of carbohydrate, protein, and fat desired at each meal and snack, type of insulin, if needed, and the recommended carbohydrate distribution determined by the type of insulin administered. For example, if the above sample diet were used by a patient taking NPH-insulin, the following meal plan would be appropriate, taking into account the need for 3 meals plus snacks both in the afternoon and evening. The appropriate carbohydrate distribution would be ⅜ each for breakfast, lunch, and dinner and ⅛ each for the afternoon and evening snacks (see Table 10–5). Protein should be present in each meal and snack throughout the day.

Table 10–5 Meal Plan for Diabetic Patient

Meals	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)
	Breakfast				Lunch				Dinner			
Milk	1	12	8	–	1	12	8	–				
Vegetable					1	5	2	–	1	5	2	–
Fruit	1½	15	–	–	1½	15	–	–				
Bread	1	15	2	–	1	15	2	–	3	45	6	–
Meat	1	–	7	3	2	–	14	6	2	–	14	6
Fat	1	–	–	5	2	–	–	10	3	–	–	10
Subtotal		42	17	8		47	26	16		50	22	16
Snacks	10 am				2 pm				evening			
Starch					1½	22	3	–	1½	22	3	–
Meat									1		7	3
Fat					1			5				5
Subtotal						22	3	5		22	10	8
DAILY TOTAL		184	78	53								

Using this breakfast, lunch, dinner, and snack meal plan and the booklet found in Appendix A, the following food intake may be planned for a particular day:

Breakfast
Milk, skim, 1 cup
Orange juice, ¾ cup
Raisin bread, 1 slice
Egg, 1
Margarine, 1 teaspoon

Lunch
Milk, skim, 1 cup
Carrots, raw, ½ cup (1 medium)
Cherries, 15 large
Saltine crackers, 6
Cottage cheese, ½ cup
Margarine, 1 teaspoon

2 p.m. Snack
Graham cracker, 3–2½ inch square crackers
Margarine, 1 teaspoon

Dinner
Green beans, ½ cup
Corn on the cob, 1 small
Potatoes, mashed, ½ cup
Biscuit, 1
Chuck roast, 2 ounces
Margarine, 1 to 2 teaspoons

Evening Snack
Popcorn, popped with 1 teaspoon margarine, 4½ cups
Cheese or chipped beef, 1 ounce

The patient should be taught how to plan such meals, using the exchange lists in Appendix A. Sample menus devised by a clinical dietitian may be given as guides for planning.

A calculated exchange list diet may not be appropriate for all diabetics. An adult-onset diabetic at or near ideal body weight and some patients maintained on oral agents probably do not need an extensive diet plan. A list of foods containing a high concentration of sucrose which should be avoided should be discussed with the patient.

Counseling the Patient

The diabetic patient must be helped to accept the fact that diabetes cannot be cured but with proper dietary care and with or without medications he can lead a comfortable and productive life. His disease, treatment, and diet must be taught to him in understandable terms. No patient can accept the diagnosis of diabetes mellitus and learn to manage its control during a short seven-day hospitalization or during two visits to the physician's office. The need for continuous care is paramount for patient understanding and adherence. The number and frequency of office visits are dependent on the individual patient. You may want to employ the services of a registered clinical dietitian to teach the diabetic diet to your patients and provide the necessary continuity of care needed by these patients.

When teaching the patient about his diet, it would be well to remember three important points to help in encouraging patient adherence to the diet:

1. Use food models to teach the patient about foods, food portion size, and the exchange system (see Resources for the Physician at the end of this module for information on food models).
2. Ascertain from the patient any ethnic eating practices he may employ and modify teaching materials to reflect the patient's food choices.
3. Involve other members of the patient's family in the counseling sessions so that they understand the disease and diet and can be of support to the patient.

Menu Variety

Instructing the patient how to include ethnic and favorite family and restaurant foods in the diabetic diet increases patient adherence and satisfaction.

Increased compliance can be facilitated by supplying the patient with nutrient information concerning combination dishes, convenience foods, "fast foods," home recipes, and special "diabetic foods." Included in Appendix B is a supplementary exchange list which gives the approximate exchange values of several combination dishes and convenience foods. Fast food restaurants have supplied nutritional information on their menu items, and exchange values are given for fast foods in Appendix C.

When eating out at restaurants where exchange lists for foods served are not available, the patient would be wise to order foods which are simply prepared, such as broiled or baked meats, baked potatoes, seasoned but not creamed vegetables, fresh salads, fresh fruits for dessert, and beverages. Combination dishes served in restaurants contain various ingredients which the patient may find difficult to identify and plan into his meal pattern.

Purchasing "special diabetic foods" is not necessary in order to conform to the goals of the diabetic diet. Regularly available food items, which are considerably less expensive, may be used.[12] For example, regular canned fruit in syrup may be used if the fruit is rinsed and drained. Items such as sugar-free carbonated beverages, jams, jellies, and gelatin may be used and can increase the esthetic pleasure of the diet, and are inexpensive. Usually patients are asked to avoid "diabetic" or "dietetic" candy, cookies, and ice cream. These products contain an appreciable amount of carbohydrate and kilocalories which must be counted in the patient's diet. Unfortunately, and erroneously, many patients have the tendency to correlate the word "dietetic" with unlimited allowable amounts in the diet.

Favorite family recipes and combination dishes can be calculated into exchanges by the following method:

1. Write down the amount of each ingredient in the recipe.
2. Calculate the number of exchanges of each item by using the exchange lists. For example, in a recipe including the following ingredients, exchanges can be calculated:
   1 cup cooked rice = 2 bread-starch exchanges
   8 ounces ground beef = 8 meat exchanges + 4 fat exchanges
   1 cup tomatoes = 2 vegetable exchanges
3. Total the number of each of the exchanges in the recipe. For example, add all the meat exchanges, bread-starch exchanges, vegetable exchanges, etc.
4. Divide each total exchange by the total number of servings in the recipe to calculate the number of exchanges per serving.

Use of Alcohol

Some physicians allow their diabetic patients to have alcohol in moderation. However, the patient must be instructed to (1) select beverages which do not contain sugar, (2) also eat when drinking, and (3) count alcohol kilocalories as fat exchanges.

Diabetics should be encouraged to avoid alcoholic beverages or to use alcohol in moderation (no more than 1 to 2 drinks per meal). Distilled liquor alone does *not* elevate blood sugar as it is metabolized as fat and therefore has a hypoglycemic effect. Patients should be instructed to eat food as they drink due both to the hypoglycemic effect of alcohol and to the confusing and similar signs of alcoholic intoxication and hypoglycemia. Because alcohol does contain approximately 7 kilocalories per gram, it can add a significant amount of kilocalories to the diet. If the energy prescription is equal to or less than 1,500 kilocalories, alcoholic beverages must be excluded from the diet because alcohol kilocalories without nutrients make it almost impossible to meet the patient's daily nutrient needs. If alcohol is allowed in the diet, the energy value of the amount used should be subtracted from the kilocalorie prescription before the grams of carbohydrate, protein, and fat are calculated. Patients using sulfonylurea agents may be intolerant of alcohol.

If consumed, alcoholic beverages which do not contain carbohydrate should be chosen — the distilled spirits. Good suggestions for drinks include scotch or rye or bourbon or vodka or gin and water, whiskey mixed with diet soft drinks, and dry wine. Fermented spirits — beer, ale, and sweet wine — on the other hand, do contain carbohydrate.

The kilocalorie and carbohydrate contents of some common alcoholic beverages and how they should be counted as exchanges are listed in Table 10–6.

Sick Day Meal Plan

Careful attention must be given to the diabetic who cannot eat solid food following dental work or during a bout with gastrointestinal upset. During these periods control is already compromised. It is imperative that the patient avoid dehydration, ketosis, or hypoglycemic episodes through the use of a liquid or soft meal plan.

Table 10–6 Kilocalorie Content, Carbohydrate Content, and Exchanges for Various Alcoholic Beverages

	Ounces	Kilocalories	Carbohydrate (grams)	Exchanges
Rum, whiskey, vodka				
42 proof	1½	50	-	1 fat
80 proof	1½	97	-	2 fat
100 proof	1½	124	-	3 fat
Beer, regular	12	170	16	1 bread, 2 fat
Light Beer	12	96	3	2 fat
Wine				
Dry, table	4	90	3	2 fat
Dry, sherry	2	75	2	1½ fat

When a patient cannot eat his regular meal plan because of any of a number of reasons, he should be instructed to take his usual medication and use a special meal plan for sick days. One approach to planning a "sick day diet" is to replace the total amount of carbohydrate and ½ the amount of protein in the diet. For example, if a breakfast meal usually consists of 52 grams of carbohydrate and 19 grams of protein, the replaced sick day meal plan would include 62 grams of carbohydrate (52 grams carbohydrate × 100% = 52 grams + 19 grams protein × 50% = 10 grams for a total of 62 grams recommended carbohydrate replacement). Given in several small feedings within two to three hours of the regular meal times, the sick meal plan could be translated into food as follows:

2 fruit exchanges (1 cup orange juice)	= 20 grams carbohydrate
2 bread exchanges (2 slices toast)	= 30 grams carbohydrate
1 milk exchange (1 cup milk)	= 12 grams carbohydrate
	62 grams

Using another approach, the patient could be instructed to take all of the exchanges which contain carbohydrate and include as many of his allowed meat servings that he can tolerate on sick days.

Franz has suggested that the patient consume 50 grams of carbohydrate for each meal missed.[12] This does not, however, take into account the different insulin doses or the original caloric plan prescribed for the individual patient.

Whichever method is used to replace meals, the patient must be instructed to take foods slowly throughout the day, since liquid or soft foods tend to have higher concentrations of simple sugars and are absorbed rapidly.

Test Your Knowledge

Mrs. Smith is a 60-year-old retired widow who lives alone, is 5 feet 3 inches tall, and weighs 160 pounds.

1. Use the Hamwi formula detailed in this module to calculate her ideal body weight.

2. Use the modified Fogarty Center height-weight table (see Table 10–2) and find her "desirable" weight and range.

3. Using the nomogram (see Figure 10–2), ascertain Mrs. Smith's basal energy requirement in kilocalories (Scale V).

4. Assume she has light activity and ascertain from the nomogram her food allowance (Scale VII).

Two years ago Mrs. Smith was diagnosed as adult-onset diabetic, placed on Diabinese, and told to restrict simple sugars in her diet. She presents to you now with a fasting blood sugar in the low 300s and complains of occasional polyuria and polydipsia. You decide to initiate insulin therapy working up to 1 injection of 20 units of Lente and 5 units of regular insulin every morning. Mrs. Smith has never been instructed on the ADA diet. She gives you the following typical diet history:

Breakfast	**Lunch**	**Dinner**
Orange juice, ½ c	Sandwich	Fried chicken, 1 breast (3 oz)
Branflakes, 1 c	Bologna, 1 oz	Potato, 1 with gravy (2 Tbsp)
Milk, 1 c	Bread, 2 sl	Salad, French dressing (3 Tbsp)
Sugar, 2 tsp	Cupcake or cookie	Cornbread, 3-in cube
Coffee, black	Coke, 12 oz	Pudding, ½ c

5. List five major goals in the dietary management of the diabetic discussed in this module.

6. If Mrs. Smith's ideal body weight is approximately 115 pounds, calculate an appropriate weight reduction kilocalorie prescription using the simple formula discussed in this module.

7. Using the space provided here, plan an appropriate diet for Mrs. Smith using the exchange system. Give the total carbohydrate, protein, and fat content in the diet.

Meals	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)
	Breakfast				**Lunch**				**Dinner**			
Milk												
Vegetable												
Fruit												
Bread												
Meat												
Fat												
Subtotal												
Snacks	10 am				2 pm				Evening			
Starch												
Meat												
Fat												
Subtotal												
DAILY TOTAL												

8. Using the booklet in Appendix A, *Exchange Lists for Meal Planning*, review what you would discuss with Mrs. Smith concerning how to select foods which would meet the pattern you planned in Question 7.

9. If in one year Mrs. Smith loses 30 pounds, is close to her ideal body weight, and can be taken off insulin, how might you change her diet? What kilocalorie level would be a weight maintenance diet? Would you change the carbohydrate distribution?

References

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7. Felig, P.: "Body Fuel Metabolism and Diabetes Mellitus in Pregnancy." *Medical Clinics of North America*, 61(1):43-65, 1977.
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9. Crapo, P.A., Reaven, B. and Olefsky, J.: "Plasma Glucose and Insulin Responses to Orally Administered Simple and Complex Carbohydrate." *Diabetes*, 25:741-747, 1976.
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Resources for the Physician

Organization and Resources Sites

Professional membership in the American Diabetes Association

American Diabetes Association, Inc.
600 Fifth Ave.
New York, NY 10020

Diabetes Education Center
4959 Excelsior Blvd.
Minneapolis, MN 55416

NASCO Life/Form Food Replicas
901 Janesville Ave.
Fort Atkinson, WI 53538
or
1524 Princeton Ave.
Modesto, CA 95352

Periodicals

Contemporary Nutrition, Sloan, A.E. (ed.), free.
General Mills, Inc.
P.O. Box 1113
Minneapolis, MN 55440

Diabetes, published monthly by the American Diabetes Association, free to professional members.
American Diabetes Association
600 Fifth Ave.
New York, NY 10020

Diabetes Care, published bi-monthly by the American Diabetes Association, $20.00 per year.
Address: (see above)

Journal of the American Dietetic Association, published monthly by the American Dietetic Association, $30.00 per year for non-members, free to members.
American Dietetic Association
430 N. Michigan Ave.
Chicago, IL 60611

Books and Pamphlets

Diabetes Mellitus: New York, American Diabetes Association, 1975. ($6.50)

Guthrie, D.W. and Guthrie, R.A.: *Nursing Management of Diabetes Mellitus*. St. Louis, MO, C.V. Mosby, 1977. (paperback $8.95)

Journal Articles

Arkey, R.A.: "Current Principles of Dietary Therapy of Diabetes Mellitus." *Medical Clinics of North America*, 62(4):655-662, 1978.

Flood, T.M.: "Diet and Diabetes Mellitus." *Hospital Practice*, 14(2):61-69, 1979.

Goldsmith, M.P. and Davidson, J.K.: "Southern Ethnic Food Preferences and Exchange Values for the Diabetic Diet." *Journal of the American Dietetic Association*, 70:61-64, 1977.

Isof, J.J. and Alonga, M.T.: "Better Use of Resources Equals Better Health for Diabetics." *American Journal of Nursing*, 77(1):1792-1795, 1977.

Mintz, D.H., Skyler, J.S. and Chez, R.A.: "Diabetes Mellitus and Pregnancy." *Diabetes Care*, 1(1):49-63, 1978.

West, K.: "Diet Therapy of Diabetes: An Analysis of Failure." *Annals of Internal Medicine*, 79:425-434, 1973.

Resources for the Patient

Subscription and membership in the American Diabetes Association, which includes a subscription to *Diabetes Forecast*, issued bi-monthly, $5.00.

American Diabetes Association, Inc.
600 Fifth Ave.
New York, NY 10020

Subscription to *Diabetes in the News*, free.

233 East Eric Street, Suite 712
Chicago, IL 60611

Supplementary Exchange Lists

"Exchange Lists for Meal Planning," in braille, large type, audiotape, free.

Volunteer Braille Service
P.O. Box 1592
Houma, Louisiana 70361

Ethnic/Diabetes Information Kit, American Dietetic Association, $2.00 each.

430 North Michigan Avenue
Chicago, IL 60611

"Vary Your Diet with Good Exchanges," American Diabetes Association, Inc., *ADA Forecast*, Reprint 100, 20¢ each; 3 for 50¢.

American Diabetes Association, Inc.
600 Fifth Ave.
New York, NY 10020

"Exchanges for Special Occasions," Fruin, M., Hargrave, M. and Lavelle, M., Diabetes Education Center, booklet, $1.00.

4959 Excelsior Blvd.
Minneapolis, MN 55416

"My Food Plan," for patients with limited reading ability. Six page folder, 1972, 8¢ plus postage, minimum order $1.00, checks payable to "State of Florida Treasurer."

State of Florida
Department of Health and Rehabilitation Services
P.O. Box 210
Jacksonville, FL 32201

Cookbooks

Bowen, A.: *The Diabetic Gourmet*. New York, Harper & Row, Everyday Handbooks, 1973. (paperback $2.50)

Gormican, A.: *Controlling Diabetes with Diet*. Springfield, IL, Thomas, 1976. (paperback $6.75)

Kaplan, D.: *The Comprehensive Diabetic Cookbook*. New York, Fell, 1977. (paperback $4.95)

Strachan, C.B.: *The Diabetic Cookbook*. Houston, TX, The Medical Arts Publishing Foundation, 1978. ($4.95)

Middleton, K.H. and Abbott, M.: *The Art of Cooking for the Diabetic*. 1978, Contemporary Book, Inc., $10.95.

Little, B.: *Recipes for Diabetics*. New York, Bantam, 1975. (paperback $2.50)

Answers

1. Female, 5 feet 3 inches in height. Ideal body weight = 100 pounds + (3 × 5) = total 115 pounds.

2. 116 pounds, range 105 to 134 pounds.

3. 2,000 kilocalories

4. Assuming a +10% food factor (Scale V) for a light activity level, a 2,200 kilocalorie food allowance from Scale VII is ascertained.

5. 1. Regulate blood sugar to as near normal as possible.
   2. Promote desirable weight status in the adult.
   3. Supply adequate amounts of all nutrients — carbohydrate, protein, fat, vitamins, minerals, and fluid.
   4. Prevent or delay the long-term complications of diabetes.
   5. Satisfy the patient's desire for pleasurable meals and improve the patient's feeling of well-being.

6. Ideal body weight × 10 kilocalories per pound to lose weight = 115 × 10 = 1,150 kilocalorie ADA weight reduction plan.

7. Attempt planning the 1,150 kilocalorie ADA diet by distributing the kilocalories as follows:

   Carbohydrate = 50% = 575 kilocalories = 144 grams (4 kilocalories/gram)
   Protein = 20% = 230 kilocalories = 58 grams (4 kilocalories/gram)
   Fat = 30% = 345 kilocalories = 37 grams (9 kilocalories/gram)

   Because the patient is receiving regular and intermediate-type insulins, carbohydrate should be distributed in 8ths at each meal, 2/8 each for breakfast, lunch, and dinner (approximately 36 grams carbohydrate) and 1/8 each for the 2:00 p.m. and evening snacks (approximately 18 grams carbohydrate at each snack).

   Based on Mrs. Smith's typical daily intake of

   1½ milk exchanges
   1 fruit exchange
   1 vegetable exchange
   6 bread exchanges
   4 meat exchanges
   7 fat exchanges

   the following plan is begun:

Food List	Servings	C gm	P gm	F gm
Milk	2	24	16	0
Fruit	2	20	0	0
Vegetable	2	10	4	0
Subtotal		54	20	0
Bread	6	90	12	0
Subtotal		144	32	0
Meat	4	0	28	12
Subtotal		144	60	12
Fat	5	0	0	25
Total		144	60	37

The next step in planning the diabetic diet is to distribute the carbohydrate throughout the meals of the day, approximately 36 grams (⅜ of total) each for breakfast, lunch, and dinner and 18 grams (⅛ of total) each at the 2:00 p.m. and evening snacks. Distribute the carbohydrate, protein, and fat as similarly as possible to the way Mrs. Smith eats at home. As you can see, you must tell her to omit the sucrose from her diet including the sugar in her coffee for breakfast, cookie or cupcake at lunch (substitute a raw vegetable), and her Coke at lunch (try a diet cola).

Meals	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)	Amount	C (gm)	P (gm)	F (gm)
	Breakfast				**Lunch**				**Dinner**			
Milk	1	12	8	0					1/2	6	4	0
Vegetable					1	5	2	0	1	5	2	0
Fruit	1	10	0	0								
Bread	1	15	2	0	2	30	4	0	2	30	4	0
Meat					1		7	3	3	0	21	9
Fat									3			15
Subtotal		37	10	0		35	13	3		41	31	24
Snacks	**10 am**				**2 pm**				**evening**			
Starch					Bread 1	15	2	0	Milk	6	4	0
Meat									Fruit	10	0	0
Fat					Fat 2	0	0	10				
Subtotal						15	2	10		16	4	0
DAILY TOTAL		144	60	37								

Translating these exchanges into a sample meal plan could include:

Breakfast
½ c orange juice
½ c bran flakes
1 c skim milk

Lunch
Sandwich
2 sl whole wheat bread
1 oz low fat cheese or 1 egg or 1 oz lean roast beef or 1 oz chicken
Raw vegetable, any as desired

2:00 p.m. Snack
6 saltines
2 tsp margarine

Supper
½ c skim milk
Raw or cooked vegetables as desired
1 sm baked potato
one 2 inch × 2 inch × 1 inch piece corn bread
3 oz baked chicken
2 tsp margarine

Evening Snack
½ c skim milk
1 sm apple or 1 med peach

8. Refer to the *Exchange Lists for Meal Planning* in Appendix A.

9. You may wish to dispense with the recommendation for strict carbohydrate distribution and instead emphasize the need to continue following a simple sugar restriction. Kilocalorie level should be increased to approximately 1,500 kilocalories, or whatever kilocalorie level will support the maintenance of the 130-pound weight.

Appendix A

For The Diet Counselor

The updated **Exchange Lists For Meal Planning** reflect the most current thinking in the area of nutrition education. Based on concern for total caloric intake and for modifications of fat intake the Exchange Lists now include many revisions and additions.

LIST 1, Milk Exchanges, now includes Non-Fat, Low-Fat and Whole Milk. **LIST 2,** Vegetable Exchanges, includes all vegetables except Starchy Vegetables. Vegetables on **LIST 2** average 25 calories for one-half cup servings. Starchy Vegetables appear in **LIST 4,** Bread Exchanges. **LIST 5,** Meat Exchanges, includes not only Lean Meat, but also Medium-Fat and High-Fat Meats and other protein-rich foods. **LIST 6,** Fat Exchanges, has been revised to show differences in the kind of fat contained in them—Saturated or Polyunsaturated. Saturated fat has been associated with an *increase* in blood cholesterol (a possible risk factor in coronary heart disease). The physician may advise a reduction of foods high in this kind of fat. Polyunsaturated fat has been associated with a *decrease* in blood cholesterol. You then may advise substituting foods containing this kind of fat whenever possible. **Bold type** is used to indicate Low-Fat foods or foods high in polyunsaturated fats.

As an additional tool for nutrition education each List contains information on vitamin and mineral content of foods listed.

Exchange Lists For Meal Planning

A Helpful Guide For A Healthier You

Eating Well While Eating Right

Let's face it. Food is one of life's basic necessities, and eating is one of our greatest pleasures.

Throughout history we have had a tendency to overindulge in the kinds of foods that can eventually be harmful to us. In many countries a campaign is underway to emphasize the importance of good nutrition.

Today nearly everyone, especially people with diabetes, is concerned about nutrition. Simply defined: Nutrition is the food you eat and what the body does with it.

When we hear the word "nutrition" we often think of "diet," and this word often has negative overtones. "Diet" can imply a set of rigid rules for eating dull, monotonous food. We tend to think this way, because we sometimes remember our childhood when Mother said, "Finish your spinach, Sally, or you won't get dessert."

Early in life, then, we can be conditioned to think that "good" foods must always be dull while "bad" foods are always tastier. Unfortunately, this attitude can carry over into adult life.

Developing the right attitude about food habits is the first, most important step in the right direction toward good health. Each of us, whether we are eating poorly or well, is on a diet. We are what we eat. While we often must compromise between the kinds and amounts of food we prefer and what is best for keeping us in good health, in most cases we can still have fun while eating and still enjoy tasty, tempting dishes.

Of course many people are eating well-balanced meals and only require a few simple changes in their diet. However, if a number of changes are necessary the Exchange Lists offer a wide selection of foods for individual meal planning for people with diabetes and others concerned about weight control, good health, and prevention of heart disease.

This will help you get on the right track to good nutrition and better health. You will find that such a journey can be fun, and you will soon discover a renewed interest in taking care of yourself. Good luck and good eating with the Exchange Lists For Meal Planning.

What Are Exchange Lists?

If variety is the spice of life, Exchange Lists are just what you're looking for.

What do we mean by Exchange Lists? When we think of an "exchange" we automatically think of a "substitute" or a "trade." (I'll trade you an apple for an orange.) Basically, that's how it works, but the possibilities are endless.

Diets are sometimes stated in very dull, specific terms. For example:

Orange juice	1/2 cup
Oatmeal	1/2 cup
Rye toast	1 slice
Soft cooked egg	1
Butter	1 teaspoon
Milk	1/2 pint

Exchange Lists take the dreariness out of diets. The Lists are groups of measured foods of the same value that can be substituted in Meal Plans. Foods have been divided into six groups, or Exchanges. For example, vegetables are listed in one group and fats are listed in another group. Foods in any *one group* can be substituted or exchanged with other foods in the *same group*.

Within each group an Exchange is approximately equal in calories and in the amount of carbohydrate, protein and fat. In addition, each Exchange contains similar minerals and vitamins.

The number of calories in any food expresses the energy value of the food. As an adult you may need fewer calories to maintain normal weight. Many people as they reach their 30's and 40's become physically less active but do not change their eating habits. They store their excess calories as fat. The result: the famous "middle age spread." Your diet counselor will know how many calories you require each day to maintain good health.

Fats, carbohydrates and proteins are the three major energy sources in foods. The most common carbohydrates are sugars and starches. Proteins yield energy and contain nitrogen, which is essential for life. Fats provide energy and are the most concentrated source of calories. Alcohol also contributes calories.

Minerals and vitamins are substances present in food in small amounts and perform essential functions in the body. The foods of each Exchange make a specific nutritional contribution. No one Exchange group can supply all the nutrients needed for a well-balanced diet. It takes all six of them working together as a team to supply your nutritional needs for good health.

The Six Major Exchange Lists

LIST 1	**Milk Exchanges**	(**Non-Fat,** Low-Fat and Whole Milk)
LIST 2	**Vegetable Exchanges**	(All **Non-Starchy Vegetables**)
LIST 3	**Fruit Exchanges**	(All **Fruits** and **Fruit Juices**)
LIST 4	**Bread Exchanges**	(**Bread, Cereal, Pasta, Starchy Vegetables** and Prepared Foods)
LIST 5	**Meat Exchanges**	(**Lean Meat,** Medium-Fat Meat, High-Fat Meat and Other Protein-Rich Foods)
LIST 6	**Fat Exchanges**	(**Polyunsaturated,** Saturated and Monounsaturated)

You + Exchange Lists + Your Diet Counselor's Advice = A Better Meal Plan For A Healthier You

Your best friend is your diet counselor when it comes to using these Exchange Lists for your meal planning. Your diet counselor is your Registered Dietitian. If necessary, your physician or teaching nurse might also be of some assistance.

When you discuss your Meal Plan with your diet counselor, he or she will tell you how many Exchanges you can have from each of the six Lists, taking into account how many calories will be best for you. The amount may change from time to time depending on your health, energy needs and physical activities. The total Exchanges will probably be divided into three meals and one or two snacks.

In helping you with your Meal Plan your diet counselor will ask you about the kind of work you do and where you usually eat your meals. Typical questions might be: "Do you eat all your meals at home?" "Do you carry a lunch from home?" "Do you eat in restaurants?" "What times of day do you eat?"

Your diet counselor will also need to know the foods you prefer, the foods your family is eating, your shopping habits and how much money you budget for food.

The chances are high that you will crave some foods and recipes that are particular favorites and used for special holiday celebrations. And the chances are good that you can enjoy these foods occasionally and in limited amounts. The secret is to convert and adjust the ingredients of the favorite recipes to fit the different Exchanges within your prescribed Meal Plan. Your diet counselor can help you. Keep a list of your questions and the foods you miss the most. Then ask your diet counselor for advice. With some imagination and understanding you will soon learn to make safe judgments for yourself.

Putting The Exchange Lists To Work In Planning Your Meals

Remember this old nursery rhyme?

Jack Sprat could eat no fat
His wife could eat no lean
And so betwixt the two of them
They licked the platter clean

Individuals differ in the kinds and amounts of foods they can eat to maintain good health. Life-styles also differ widely among people. That's why it's important to consult your diet counselor *before* you begin to use the Exchange Lists. But whether you are young or old, living alone or in a family group, pursuing a busy career and/or keeping a home, you and your diet counselor can use these Exchange Lists to help plan your meals.

Your first step in using the Lists is to remember your meal plan is not one which necessarily requires special foods and special preparation. Think of your Meal Plan as a reasonable variation of an ordinary good meal.

You can eat at the family table, because tasty, nutritious family meals include foods that you, too, can eat. Sometimes you will need to set your serving aside before seasonings and thickenings like sugar, flour and fat are added to the family's servings.

You can learn to eat away from home, too, either in your friends' homes or in restaurants. You can learn to estimate what is in the food served to you, or you can ask about it.

Occasionally you may have to skip some foods if you do not know enough about them. The *types* of food you eat are important, but many times it is the *amount* of food that is more important.

The foods in each Exchange List are the familiar, everyday foods you can buy at your supermarket. When you become familiar with the Exchange Lists you will notice that some foods are not mentioned. They have been

omitted, because they have too much concentrated sugar and may be too high in calories to be safe in your diet. The following foods should not be included in your Meal Plan without permission of your diet counselor:

No No No

Sugar	Syrup
Candy	Condensed Milk
Honey	Chewing Gum
Jam	Soft Drinks
Jelly	Pies
Cookies	Cakes

It is recommended that you discuss with your counselor the use of alcoholic beverages and sugar substitutes. It is essential to pay strict attention to the type of sugar substitute purchased and the amounts used.

Putting The Exchange Lists To Work In Planning Your Meals

Another tip for using the Exchange Lists is to remember there are certain foods you can use in unlimited amounts when planning your meals. Some of these include:

Yes Yes Yes

Diet calorie free beverage
Coffee
Tea
Bouillon without Fat
Unsweetened Gelatin
Unsweetened Pickles

If you like to add seasonings to your food, don't forget there are many you can use freely. Some of the seasonings you may want to consider include:

More Yes Yes Yes

Salt and Pepper	**Mustard**
Red Pepper	**Chili Powder**
Paprika	**Onion Salt or Powder**
Garlic	**Horseradish**
Celery Salt	**Vinegar**
Parsley	**Mint**
Nutmeg	**Cinnamon**
Lemon	**Lime**

When doing your grocery shopping you will want to become acquainted with the different types of labeling. Your diet counselor can help you interpret the labels. By law, if a label or advertisement makes a nutritional claim, such as references for use in "special diets," the label must contain the number and size of servings and the content of calories and certain key nutrients per serving.

Nutritional labeling is a valuable tool for everyone interested in planning a nutritious diet. And more important, the labels can help you use dietary products you may have avoided because of lack of information about nutrients.

Acquaint Yourself With Food Labeling

When reading labels, keep in mind three important tips:

1. A label advertising "dietetic" food does not necessarily mean the food is intended for people with diabetes.
2. A label advertising "dietetic" food does not necessarily mean the food can be eaten in unlimited amounts.
3. Always consult your diet counselor, particularly when new foods labeled "sugar free" or "fat free" are displayed in your supermarket.

Measurements Used Most Often In **Exchange Lists For Meal Planning**

Weight: 1 ounce or 30* grams

*The precise figure is 28.25. However some dietitians find it more convenient to use 30.

Volume: 1 teaspoon or 5 milliliters
1 tablespoon or 15 milliliters
1 fluid ounce or 30 milliliters
1 cup or 0.24 liters

Length: 1 inch or 2.5 centimeters

Your Food For The Day

Breakfast			
Snack			
Lunch or Dinner			
Snack			
Dinner or Supper			
Bedtime Snack			

Your Meal Plan In Exchanges

Must Be Planned With The Assistance Of Your Diet Counselor

Meal Plan For _____

Carbohydrate _____ grams Protein _____ grams Fat _____ grams Calories _____

	1 Milk	2 Vegetable	3 Fruit	4 Bread	5 Meat	6 Fat
Breakfast Time_____						
Snack Time_____						
Lunch or Dinner Time_____						
Snack Time_____						
Dinner or Supper Time_____						
Bedtime Snack Time_____						

NOTE TO DIETITIAN When listing Exchanges Specify:

LIST 1, Non-Fat, Low-Fat or Whole Milk – If Fat Exchange is to be omitted
LIST 4, If Fat Exchange is to be omitted
LIST 5, Lean Meat, Medium-Fat or High-Fat Meat – If Fat Exchange is to be omitted
LIST 6, Polyunsaturated or Saturated Fat

LIST 1 Milk Exchanges (Includes **Non-Fat** Low-Fat and Whole Milk)

One Exchange of Milk contains 12 grams of carbohydrate, 8 grams of protein, a trace of fat and 80 calories.

Milk is a basic food for your Meal Plan for very good reasons. Milk is the leading source of calcium. It is a good source of phosphorus, protein, some of the B-complex vitamins, including folacin and vitamin B_{12}, and vitamins A and D. Magnesium is also found in milk.

Since it is a basic ingredient in many recipes you will not find it difficult to include milk in your Meal Plan. Milk can be used not only to drink but can be added to cereal, coffee, tea and other foods.

This List shows the kinds and amounts of milk or milk products to use for one Milk Exchange. Those which appear in **bold type** are **non-fat**. Low-Fat and Whole Milk contain saturated fat.

Non-Fat Fortified Milk

Skim or non-fat milk	1 cup
Powdered (non-fat dry, before adding liquid)	1/3 cup
Canned, evaporated—skim milk	1/2 cup
Buttermilk made from skim milk	1 cup
Yogurt made from skim milk (plain, unflavored)	1 cup

Low-Fat Fortified Milk

1% fat fortified milk (omit 1/2 Fat Exchange)	1 cup
2% fat fortified milk (omit 1 Fat Exchange)	1 cup
Yogurt made from 2% fortified milk (plain, unflavored) (omit 1 Fat Exchange)	1 cup

Whole Milk (Omit 2 Fat Exchanges)

Whole milk	1 cup
Canned, evaporated whole milk	1/2 cup
Buttermilk made from whole milk	1 cup
Yogurt made from whole milk (plain, unflavored)	1 cup

LIST 2 Vegetable Exchanges

One Exchange of Vegetables contains about 5 grams of carbohydrate, 2 grams of protein and 25 calories.

The generous use of many vegetables, served either alone or in other foods such as casseroles, soups or salads, contributes to sound health and vitality.

Dark green and deep yellow vegetables are among the leading sources of vitamin A. Many of the vegetables in this group are notable sources of vitamin C—asparagus, broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, dandelion, mustard and turnip greens, spinach, rutabagas, to tomatoes and turnips. A number, including broccoli, brussels sprouts, beet greens, chard and tomato juice, are particularly good sources of potassium. High folacin values are found in asparagus, beets, broccoli, brussels sprouts, cauliflower, collards, kale and lettuce. Moderate amounts of vitamin B_6 are supplied by broccoli, brussels sprouts, cauliflower, collards, spinach, sauerkraut and tomatoes and tomato juice. Fiber is present in all vegetables.

Whether you serve them cooked or raw, wash all vegetables even though they look clean. If fat is added in the preparation, omit the equivalent number of Fat Exchanges. The average amount of fat contained in a Vegetable Exchange that is cooked with fat meat or other fats is one Fat Exchange.

This List shows the kinds of **vegetables** to use for one Vegetable Exchange. One Exchange is ½ cup.

Asparagus
Bean Sprouts
Beets
Broccoli
Brussels Sprouts
Cabbage
Carrots
Cauliflower
Celery
Eggplant
Green Pepper
Greens:
- **Beet**
- **Chards**
- **Collards**
- **Dandelion**
- **Kale**
- **Mustard**
- **Spinach**
- **Turnip**

Mushrooms
Okra
Onions
Rhubarb
Rutabaga
Sauerkraut
String Beans, green or yellow
Summer Squash
Tomatoes
Tomato Juice
Turnips
Vegetable Juice Cocktail
Zucchini

The following **raw vegetables** may be used as desired:

Chicory
Chinese Cabbage
Cucumbers
Endive
Escarole
Lettuce
Parsley
Pickles, Dill
Radishes
Watercress

Starchy Vegetables are found in the Bread Exchange List.

LIST 3 Fruit Exchanges

One Exchange of Fruit contains 10 grams of carbohydrate and 40 calories.

Everyone likes to buy fresh fruits when they are in the height of their season. But you can also buy fresh fruits and can or freeze them for off-season use. For variety serve fruit as a salad or in combination with other foods for dessert.

Fruits are valuable for vitamins, minerals and fiber. Vitamin C is abundant in citrus fruits and fruit juices and is found in raspberries, strawberries, mangoes, cantaloupes, honeydews and papayas. The better sources of vitamin A among these fruits include fresh or dried apricots, mangoes, cantaloupes, nectarines, yellow peaches and persimmons. Oranges, orange juice and cantaloupe provide more folacin than most of the other fruits in this listing. Many fruits are a valuable source of potassium, especially apricots, bananas, several of the berries, grapefruit, grapefruit juice, mangoes, cantaloupes, honeydews, nectarines, oranges, orange juice and peaches.

Fruit may be used fresh, dried, canned or frozen, cooked or raw, as long as no sugar is added.

This List shows the kinds and amounts of **fruits** to use for one Fruit Exchange.

Apple	1 small	**Mango**	1/2 small
Apple Juice	1/3 cup	**Melon**	
Applesauce (unsweetened)	1/2 cup	**Cantaloupe**	1/4 small
Apricots, fresh	2 medium	**Honeydew**	1/8 medium
Apricots, dried	4 halves	**Watermelon**	1 cup
Banana	1/2 small	**Nectarine**	1 small
Berries		**Orange**	1 small
Blackberries	1/2 cup	**Orange Juice**	1/2 cup
Blueberries	1/2 cup	**Papaya**	3/4 cup
Raspberries	1/2 cup	**Peach**	1 medium
Strawberries	3/4 cup	**Pear**	1 small
Cherries	10 large	**Persimmon, native**	1 medium
Cider	1/3 cup	**Pineapple**	1/2 cup
Dates	2	**Pineapple Juice**	1/3 cup
Figs, fresh	1	**Plums**	2 medium
Figs, dried	1	**Prunes**	2 medium
Grapefruit	1/2	**Prune Juice**	1/4 cup
Grapefruit Juice	1/2 cup	**Raisins**	2 tablespoons
Grapes	12	**Tangerine**	1 medium
Grape Juice	1/4 cup		

Cranberries may be used as desired if no sugar is added.

LIST 4 Bread Exchanges (Includes **Bread, Cereal** and **Starchy Vegetables**)

One Exchange of Bread contains 15 grams of carbohydrate, 2 grams of protein and 70 calories.

In this List, whole-grain and enriched breads and cereals, germ and bran products and dried beans and peas are good sources of iron and among the better sources of thiamin. The whole-grain, bran and germ products have more fiber than products made from refined flours. Dried beans and peas are also good sources of fiber. Wheat germ, bran, dried beans, potatoes, lima beans, parsnips, pumpkin and winter squash are particularly good sources of potassium. The better sources of folacin in this listing include whole-wheat bread, wheat germ, dried beans, corn, lima beans, parsnips, green peas, pumpkin and sweet potato.

Starchy vegetables are included in this List, because they contain the same amount of carbohydrate and protein as one slice of bread.

Bread

White (including French and Italian)	1 slice
Whole Wheat	1 slice
Rye or Pumpernickel	1 slice
Raisin	1 slice
Bagel, small	1/2
English Muffin, small	1/2
Plain Roll, bread	1
Frankfurter Roll	1/2
Hamburger Bun	1/2
Dried Bread Crumbs	3 Tbs.
Tortilla, 6"	1

This List shows the kinds and amounts of **Breads, Cereals, Starchy Vegetables** and Prepared Foods to use for one Bread Exchange. Those which appear in **bold type** are **low-fat.**

Cereal	
Bran Flakes	1/2 cup
Other ready-to-eat unsweetened Cereal	3/4 cup
Puffed Cereal (unfrosted)	1 cup
Cereal (cooked)	1/2 cup
Grits (cooked)	1/2 cup
Rice or Barley (cooked)	1/2 cup
Pasta (cooked), Spaghetti, Noodles, Macaroni	1/2 cup
Popcorn (popped, no fat added,large kernel)	3 cups
Cornmeal (dry)	2Tbs.
Flour	2-1/2Tbs.
Wheat Germ	1/4 cup
Crackers	
Arrowroot	3
Graham, 2-1/2" sq.	2
Matzoth, 4" x 6"	1/2
Oyster	20
Pretzels, 3-1/8" long x 1/8" dia.	25
Rye Wafers, 2" x 3-1/2"	3
Saltines	6
Soda, 2-1/2" sq.	4
Dried Beans, Peas and Lentils	
Beans, Peas, Lentils (dried and cooked)	1/2 cup
Baked Beans, no pork (canned)	1/4 cup

Starchy Vegetables	
Corn	1/3 cup
Corn on Cob	1 small
Lima Beans	1/2 cup
Parsnips	2/3 cup
Peas, Green (canned or frozen)	1/2 cup
Potato, White	1 small
Potato (mashed)	1/2 cup
Pumpkin	3/4 cup
Winter Squash, Acorn or Butternut	1/2 cup
Yam or Sweet Potato	1/4 cup
Prepared Foods	
Biscuit 2" dia. (omit 1 Fat Exchange)	1
Corn Bread, 2"x 2"x 1" (omit 1 Fat Exchange)	1
Corn Muffin, 2" dia. (omit 1 Fat Exchange)	1
Crackers, round butter type (omit 1 Fat Exchange)	5
Muffin, plain small (omit 1 Fat Exchange)	1
Potatoes, French Fried, length 2" to 3-1/2" (omit 1 Fat Exchange)	8
Potato or Corn Chips (omit 2 Fat Exchanges)	15
Pancake, 5" x 1/2" (omit 1 Fat Exchange)	1
Waffle, 5" x 1/2" (omit 1 Fat Exchange)	1

LIST 5 Meat Exchanges
Lean Meat

One Exchange of Lean Meat (1 oz.) contains 7 grams of protein, 3 grams of fat and 55 calories.

All of the foods in the Meat Exchange Lists are good sources of protein and many are also good sources of iron, zinc, vitamin B_{12} (present only in foods of animal origin) and other vitamins of the vitamin B-complex.

Cholesterol is of animal origin. Foods of plant origin have no cholesterol.

Oysters are outstanding for their high content of zinc. Crab, liver, trimmed lean meats, the dark muscle meat of turkey, dried beans and peas and peanut butter all have much less zinc than oysters but are still good sources.

Dried beans, peas and peanut butter are particularly good sources of magnesium; also potassium.

Your choice of meat groups through the week will depend on your blood lipid values. Consult with your diet counselor and your physician regarding your selection.

You may use the meat, fish or other Meat Exchanges that are prepared for the family when no fat or flour has been added. If meat is fried, use the fat included in the Meal Plan. Meat juices with the fat removed may be used with your meat or vegetables for added flavor. **Be certain to trim off all visible fat** and measure after it has been cooked. A three-ounce serving of cooked meat is about equal to four ounces of raw meat.

To plan a diet low in saturated fat and cholesterol, choose only those Exchanges in **bold type**.

This List shows the kinds and amounts of **Lean Meat** and other Protein-Rich Foods to use for one Low-Fat Meat Exchange. **Trim off all visible fat.**

Beef:	**Baby Beef (very lean), Chipped Beef, Chuck, Flank Steak, Tenderloin, Plate Ribs, Plate Skirt Steak, Round (bottom, top), All cuts Rump, Spare Ribs, Tripe**	1 oz.
Lamb:	**Leg, Rib, Sirloin, Loin (roast and chops), Shank, Shoulder**	1 oz.
Pork:	**Leg (Whole Rump, Center Shank), Ham, Smoked (center slices)**	1 oz.
Veal:	**Leg, Loin, Rib, Shank, Shoulder, Cutlets**	1 oz.
Poultry:	**Meat without skin of Chicken, Turkey, Cornish Hen, Guinea Hen, Pheasant**	1 oz.
Fish:	**Any fresh or frozen**	1 oz.
	Canned Salmon, Tuna, Mackerel, Crab and Lobster,	1/4 cup
	Clams, Oysters, Scallops, Shrimp,	5 or 1 oz.
	Sardines, drained	3
Cheeses containing less than 5% butterfat		1 oz.
Cottage Cheese, Dry and 2% butterfat		1/4 cup
Dried Beans and Peas (omit 1 Bread Exchange)		1/2 cup

Meat Exchanges
Medium-Fat Meat

One Exhange of Medium-Fat Meat (1 oz.) contains 7 grams of protein, 5 grams of fat and 75 calories.

This List shows the kinds and amounts of Medium-Fat Meat and other Protein-Rich Foods to use for one Medium-Fat Meat Exchange. **Trim off all visible fat.**

Beef:	Ground (15% fat), Corned Beef (canned), Rib Eye, Round (ground commercial)	1 oz.
Pork:	Loin (all cuts Tenderloin), Shoulder Arm (picnic), Shoulder Blade, Boston Butt, Canadian Bacon, Boiled Ham	1 oz.
Liver, Heart, Kidney and Sweetbreads (these are high in cholesterol)		1 oz.
Cottage Cheese, creamed		1/4 cup
Cheese: Mozzarella, Ricotta, Farmer's cheese, Neufchatel,		1 oz.
Parmesan		3 tbs.
Egg (high in cholesterol)		1
Peanut Butter (omit 2 additional Fat Exchanges)		2 tbs.

Meat Exchanges
High-Fat Meat

One Exchange of High-Fat Meat (1 oz.) contains 7 grams of protein, 8 grams of fat and 100 calories.

This List shows the kinds and amounts of High-Fat Meat and other Protein-Rich Foods to use for one High-Fat Meat Exchange. **Trim off all visible fat.**

Beef:	Brisket, Corned Beef (Brisket), Ground Beef (more than 20% fat), Hamburger (commercial), Chuck (ground commercial), Roasts (Rib), Steaks (Club and Rib)	1 oz.
Lamb:	Breast	1 oz.
Pork:	Spare Ribs, Loin (Back Ribs), Pork (ground), Country style Ham, Deviled Ham	1 oz.
Veal:	Breast	1 oz.
Poultry:	Capon, Duck (domestic), Goose	1 oz.
Cheese:	Cheddar Types	1 oz.
Cold Cuts		4-1/2" x 1/8" slice
Frankfurter		1 small

LIST 6 Fat Exchanges

One Exchange of Fat contains
5 grams of fat and 45 calories.

Fats are of both animal and vegetable origin and range from liquid oils to hard fats.

Oils are fats that remain liquid at room temperature and are usually of vegetable origin. Common fats obtained from vegetables are corn oil, olive oil and peanut oil. Some of the common animal fats are butter and bacon fat.

Since all fats are concentrated sources of calories, foods on this List should be measured carefully to control weight. Margarine, butter, cream and cream cheese contain vitamin A. Use the fats on this List in the amounts on the Meal Plan.

This List shows the kinds and amounts of Fat-Containing Foods to use for one Fat Exchange. To plan a diet low in Saturated Fat select only those Exchanges which appear in **bold type**. They are **Polyunsaturated.**

Margarine, soft, tub or stick*	1 teaspoon
Avocado (4" in diameter)**	1/8
Oil, Corn, Cottonseed, Safflower, Soy, Sunflower	1 teaspoon
Oil, Olive**	1 teaspoon
Oil, Peanut**	1 teaspoon
Olives**	5 small
Almonds**	10 whole
Pecans**	2 large whole
Peanuts**	
Spanish	20 whole
Virginia	10 whole
Walnuts	6 small
Nuts, other**	6 small
Margarine, regular stick	1 teaspoon
Butter	1 teaspoon
Bacon fat	1 teaspoon
Bacon, crisp	1 strip
Cream, light	2 tablespoons
Cream, sour	2 tablespoons
Cream, heavy	1 tablespoon
Cream Cheese	1 tablespoon
French dressing***	1 tablespoon
Italian dressing***	1 tablespoon
Lard	1 teaspoon
Mayonnaise***	1 teaspoon
Salad dressing, mayonnaise type***	2 teaspoons
Salt pork	3/4 inch cube

*Made with corn, cottonseed, safflower, soy or sunflower oil only
**Fat content is primarily monounsaturated
***If made with corn, cottonseed, safflower, soy or sunflower oil can be used on fat modified diet

Definitions

Alcohol—An ingredient in a variety of beverages, including beer, wine, liqueurs, cordials and mixed or straight drinks. Pure alcohol itself yields about 7 calories per gram, of which more than 75% is available to the body.

Calorie—A unit used to express heat or energy value of food. Calories come from carbohydrate, protein, fat, alcohol and alcohol derivatives (like sorbitol).

Carbohydrate—One of the three major energy sources in foods. The most common carbohydrates are sugars and starches. Carbohydrates yield about 4 calories per gram.

Cholesterol—A fat-like substance present in blood, muscle, liver, brain and all other tissues throughout the body of man and animals and therefore in foods of animal origin. Cholesterol is a key part of the fatty deposits in the arterial wall in atherosclerosis.

Enrichment—The addition of one or more nutrients to a food in order to increase the consumption of those nutrients. The nutrients added to the food are higher levels of those nutrients already present in the food. The best example of enrichment is bread or flour.

Fat—One of the three major energy sources in food. Fat yields about 9 calories per gram.

Fiber—An indigestible part of fruits, vegetables, cereals and grains. Fiber is important in the diet as roughage, or bulk.

Food Exchange—Foods grouped together on a list according to similarities in food values. Measured amounts of foods within the group may be used as "tradeoffs" in planning meals. A single Exchange contains equal amounts of calories, carbohydrates, proteins, fats, minerals and vitamins.

Food Habit—Usual pattern of an individual or group for choosing, preparing and eating food resulting from family, cultural, economic and religious influences.

Fortification—The addition of one or more nutrients to a food whether or not they are naturally present. The terms "vitamin added" or "with added vitamin(s) and mineral(s)" as well as the term "fortified" have been used to identify fortified products.

Gram—A unit of mass and weight in the metric system. An ounce is 28.25 grams.

Meal Plan—A guide showing the number of food Exchanges to use in each meal and snack to control distribution of calories, carbohydrates, proteins and fats throughout the day.

Mineral—Substance essential in small amounts to build and repair body tissue and/or control functions of the body. Calcium, iron, magnesium, phosphorus, potassium, sodium and zinc are minerals.

Definitions (continued)

Monounsaturated Fat—Fat that is neutral in that it neither raises nor lowers blood cholesterol. Olive oil and peanut oil, for example, are monounsaturated.

Nutrient—Substance in food necessary for life. Protein, fats, carbohydrates, minerals, vitamins and water are nutrients.

Nutrition—Combination of processes by which the body receives and uses the materials necessary for maintenance of functions, for energy, and for growth and renewal of its parts.

Polyunsaturated Fat—Fats from vegetable oils such as corn, cottonseed, sunflower, safflower and soybean oil. Oils high in polyunsaturated fats tend to lower the level of cholesterol in the blood.

Protein—One of the three major nutrient groups in foods which contain amino acids that are essential for the life processes. Protein provides about 4 calories per gram.

Saturated Fat—Fat that is often hard at room temperature, primarily from animal food products (like butter, lard, meat fat). Saturated fat tends to raise the level of cholesterol in the blood.

Sorbitol—A chemical substance which has a sweet taste. It contains 4 calories per gram. Because it is slowly and partially absorbed into the body, it may have a laxative action when taken in large amounts.

Vitamin—Substance essential in small amounts that assist in body processes and functions. This includes vitamins A, D, E, the B-complex and C.

Converting Is Easy

	To Change	to	Multiply by
WEIGHT			
	Ounces	Grams	30*
	Pounds	Kilograms	0.45
	Grams	Ounces	0.035
	Kilograms	Pounds	2.2
VOLUME			
	Teaspoons	Milliliters	5
	Tablespoons	Milliliters	15
	Fluid Ounces	Milliliters	30
	Cups	Liters	0.24
	Pints	Liters	0.47
	Quarts	Liters	0.95
	Gallons	Liters	3.8
	Milliliters	Fluid Ounces	0.03
	Liters	Pints	2.1
	Liters	Quarts	1.06
	Liters	Gallons	0.26
LENGTH			
	Inches	Centimeters	2.5
	Feet	Centimeters	30
	Yards	Meters	0.9
	Millimeters	Inches	0.04
	Centimeters	Inches	0.4
	Meters	Feet	3.3
	Meters	Yards	1.1

*The precise figure is 28.25. However, some dietitians find it more convenient to use 30.

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Appendix B

Table 10-7 Supplementary Exchange List

The composition of these foods have been checked by Bowes and Church (1970 Edition). Since foods vary from one composition table to another, these exchange values are approximate.

Food Mixed Dishes	Approx. Measure	Cal- ories	CHO gm	Pro. gm	Fat gm	Approximate Equivalent
Beans and Franks, (canned)	100 gm 1/3 to 1/2 cup	122	13	8	7	1 Bread, 1 Meat
Beef-A-Roni, (canned)	100 gm 1/3 to 1/2 cup	137	15	6	6	1 Bread, 1 Meat
Beef and Vegetable Stew (Cooked)	100 gm 1/3 to 1/2 cup	89	6	6	4	½ Bread, 1 Meat
" (Canned)	100 gm 1/3 to 1/2 cup	79	7	6	3	½ Bread, ½ Meat
Beef Pot Pie, Baked	(4½" dia. pie)	443	37	17	25	2 Bread, 1½ Meat, 3 Fat, 1 Fruit
Chicken Pot Pie, Baked	100 gm 1/3 to 1/2 cup	235	18	10	13	1 Bread, 1 Meat, 2 Fat
" (Commercial, frozen)	100 gm 1/3 to 1/2 cup	219	21	7	11	1½ Bread, ½ Meat, 2 Fat
Chicken and Noodles, cooked	100 gm 1/3 to 1/2 cup	153	11	9	8	1 Fruit, 1 Meat, ½ Fat
Chili Con Carne, with Beans	100 gm 1/3 to 1/2 cup	133	12	8	6	1 Bread, 1 Meat
" without Beans	100 gm 1/3 to 1/2 cup	200	16	10	15	1 Bread, 1 Meat, 2 Fats
Chow Mein, Chicken, cooked	100 gm 1/3 to 1/2 cup	102	4	12	4	½ Fruit, 1½ Meat Add 1 Fat
" " canned	100 gm 1/3 to 1/2 cup	38	7	3	.1	½ Bread
Macaroni and Cheese, cooked	100 gm 1/3 to 1/2 cup	215	20	8	11	1½ Bread, 1 Meat, 1½ Fat
" commercial, box	100 gm 1/3 to 1/2 cup	179	23	6	7	1½ Bread, 1 Meat
Lasagne, cooked (commercial)	100 gm 1/3 to 1/2 cup	150	10	6	10	1 Fruit, 1 Fat 1 Meat
Meat Loaf - Beef & Pork	70 gm 1 slice (4"x3"x3/8")	264	12	10	19	1 Bread, 1 Meat, 3 Fat
Pizza, Baked, Cheese Topping	100 gm 3" wedge	236	28	12	8	2 Bread, 1½ Meat
Pizza, Baked, Sausage topping	100 gm 3" wedge	234	30	9	9	2 Bread, 1 Meat 1 Fat

Table 10-7 (continued)

Food	Approx. Measure	Calories	CHO gm	Pro. gm	Fat gms	Approximate Equivalent
Mixed Dishes - Cont'd						
Spaghetti, Tomato Sauce	100 gm	104	15	3	3	1 Bread, ½ Fat
Cheese (Home Recipe)	1/3 to 1/2 cup					
" "	100 gm	76	15	2	.6	1 Bread, 1 Fat
canned	1/3 to 1/2 cup					
Spaghetti Sauce, with Meat	66 gm	64	6	4	4	½ Fruit, ½ Meat
	4 Tbl.					
" ", with Mushrooms	66 gm	54	6	.8	4	½ Fruit, 1 Fat
	4 Tbl.					
Turkey Pot Pie -	100 gm	237	18	10	13	1 Bread, 1 Meat,
Home Recipe	1/3 to 1/2 cup					1½ Fat
"	100 gm	197	20	6	10	1½ Bread, ½ Meat,
Commercial	1/3 to 1/2 cup					1½ Fat
Meat Dinners & Meat Pie						
Beef "T-V" Dinner	312 gm	349	25	32	14	2½ Bread, 3 Meat
1 Complete Dinner						
Beef Meat Pie	227 gm	443	37	16	25	2½ Bread, 2 Meat,
1 Individual Pie						3 Fat
Chopped Sirloin "T-V" Dinner	270 gm	483	25	31	29	1½ Bread, 4 Meat,
1 Complete Dinner						2 Fat
Ham "T-V" Dinner	284 gm	308	32	19	11	2 Bread, 2 Meat
1 Complete Dinner						
Loin of Pork "T-V" Dinner	284 gm	414	40	24	18	2½ Bread, 3 Meat,
1 Complete Dinner						½ Fat
Meat Loaf "T-V" Dinner	312 gm	369	29	22	18	2 Bread, 2½ Meat,
1 Complete Dinner						½ Fat
Swiss Steak "T-V" Dinner	284 gm	251	18	23	9	1 Bread, 3 Meat,
1 Complete Dinner						Add 1 Fat
Turkey Meat Pie	227 gm	417	36	13	24	2½ Bread, 1½ Meat,
1 Individual Pie						3 Fat
Chicken Meat Pie	227 gm	503	53	16	25	3½ Bread, 1½ Meat,
1 Individual Pie						3 Fat
Chicken "T-V" Dinner	312 gm	542	41	32	28	2½ Bread, 4 Meat,
1 Complete Dinner						1½ Fat
Haddock "T-V" Dinner	340 gm	328	21	29	14	1½ Bread, 4 Meat,
1 Complete Dinner						Add 2 Fat

Table 10-7 (continued)

Food	Approx. Measure	Calories	CHO gm	Pro. gm	Fat gm	Approximate Equivalent
Fish - Ham						
Crab, Deviled	20 gm 1 Rnd. Tbsp.	38	3	2	2	½ Bread, ½ Fat
Fish Cakes	100 gm	172	9	15	8	1 Fruit, 2 Meat
Fish Sticks	100 gm	176	6	17	9	½ Bread, 2 Meat
Canned Deviled Ham	20 gm 1 Rnd. Tbsp.	50	tr	3	4	½ Meat
Soup - Canned*						
Beef Vegetable	198 gm 1/3 can	58	7	4	2	½ Bread, ½ Fat
Cream of Chicken Diluted with Whole Milk	198 gm 1/3 can	146	11	6	9	1 Milk
Cream of Mushroom Diluted with Skim Milk	198 gm 1/3 can	149	14	5	8	1 Bread, 2 Fat
Chicken Noodle	198 gm 1/3 can	51	7	3	1	½ Bread
Clam Chowder (Broth)	201 gm 1/3 can	65	9	2	2	½ Bread, ½ Fat
Tomato	198 gm 1/3 can	73	12	2	2	1 Bread
Cream of Potato Made with Whole Milk	200 gm	152	15	6.4	6	1 Bread, 1 Meat
Bread						
Bagel	1 Ave.	200	30	11	4	2 Bread, 1 Meat
Biscuit	2" Diam.	129	16	3	6	1 Bread, 1 Fat
Bun, Hamburger	30 gm	89	16	2	2	1 Bread, ½ Fat
" , Weiner	37 gm	64	14	3	2	1 Bread, ½ Fat
Donut, Plain						
Cake type	1 Ave.	125	16	1	6	1 Bread, 1 Fat
Yeast	1 Ave.	124	11	2	8	½ Bread, 2 Fat

*Canned soups are diluted for serving by adding equal volume of water. If soup is diluted with milk, this is stated.

Table 10-7 (continued)

Food	Approx. Measure	Calories	CHO gm	Pro. gm	Fat gm	Approximate Equivalent
Bread - Cont'd						
French Toast	1 Slice	183	14	6	12	1 Bread, 2 Fat ½ Meat
Muffin	40 gm 1 Ave.	118	17	3	4	1 Bread, 1 Fat
Sweet Roll	Danish Pastry 1 Small	148	30	4	4	2 Bread, 1 Fat
Waffle	5½" sq.	209	28	7	7	2 Bread, ½ Meat, 1 Fat
Pancake	1 Ave.	103	17	3	3	1 Bread, ½ Fat
Crackers						
Melba	4 thin slices	60	11	2	1	1 Bread
Oyster Crackers	7 gm 10 crackers	30	5	1	1	½ Bread
Ritz, plain or cheese	3 crackers	34	6	.2	3	½ Bread, ½ Fat
Rye Krisp	13 gm 2 squares	42	10	1	-	1 Fruit
Thins, Onion Rye Bacon Wheat	10 to 12 crackers	90	12	1	4	1 Bread, 1 Fat
Matzoth	6" diam.	78	17	2	-	1 Bread
Potato Chips	10 chips 2" diam.	113	10	1	8	1 Fruit, 2 Fat
Pretzels Veri-Thin Sticks	20 sticks	20	5	.6	.1	½ Fruit
Vegetables						
Crinkle or Plain French Fried Potatoes	10 pieces ½x½x2" 50 gm	137	18	2	7	1 Bread, 2 Fat
Hash Brown, commercial	½ cup	229	29	3	12	2 Bread, 2 Fat
Instant Mashed Potatoes	100 gm 1/3 to 1/2 cup	64	14	2		1 Bread
Mixed Vegetables	100 gm 1/3 to 1/2 cup	65	14	3	.5	1 Bread

Table 10-7 (continued)

Food	Approx. Measure	Calories	CHO gm	Pro. gm	Fat gm	Approximate Equivalent
Desserts:						
Cake						
Angel Food	45 gm 1/10 ave. cake	121	18	6	1	1 Bread
Plain Cake	50 gm 3" x 2" x 1 3/4")	182	29	2	6	2 Bread, 1 Fat
Brownie, plain chocolate without Nuts	2" x 2" x 3/4"	146	15	2	9	1 Bread, 2 Fat
Gingerbread	57 gm 2" x 2" x 2"	206	27	2	10	2 Bread, 2 Fat
Cookies						
Butter	2½" diam.	50	8	2	1	½ Bread
Sandwich Cookies (cream filled)	23 gm 1 cookie	112	16	1	5	1 Bread, 1 Fat
Gingersnaps	4 gm 1 small	17	3.2	.2	.4	¼ Bread
Lady Fingers	14 gm 1 large or 2 small	50	9	1	1	1 Fruit
Lorna Doone	8 gm 1 cookie	38	5	2	.5	½ Bread
Vanilla Wafers	11 gm 3 wafers	51	8	1	2	½ Bread, ½ Fat
Ice Cream Cone	12 gm 1 cone	45	9	1	-	1 Fruit
Pudding						
Baked Custard	1/2 cup	205	23	9	9	1½ Bread, 1 Meat, 1 Fat
Chocolate Pudding	1/2 cup	135	22	2	4	1 Bread, 1 Fat 1 Fruit
Tapioca Pudding	1/2 cup	133	17	5	5	1 Bread, 1 Fat
Vanilla Pudding Whole Milk	1/2 cup	107	12	5	5	1 Bread, 1 Fat
" Skim Milk	1/2 cup	71	12	5	.1	1 Skim Milk

Table 10-7 (continued)

Food	Approx. Measure	Calories	CHO gm	Pro. gm	Fat gm	Approximate Equivalent
Desserts - Cont'd						
Pie						
Apple	1/6 of 9" pie	410	61	3	18	4 Breads, 4 Fat
Custard Cream	1/6 of 9" pie	327	35	9	17	2 Bread, 1 Meat, 2 Fat, 1 Fruit
Fats						
Diet Margarine	1 tsp. 16 gm	16	0	0	2	½ Fat
Whipped Toppings	4 Tbsp.	56	4	8	4	1 Fat
Coffee Lightner (Powdered)	1 Envelope 3 gm	17	1.6	.1	1.1	4 tsp. = 1 Fat
Cream Cheese	2 Rnd. Tbsp.	100	6	2	10	2 Fat
Miscellaneous						
Chocolate Milkshake	8 oz. 1 cup	421	58	11	18	1 Milk, 2 Fat 1 Fruit, 2 Bread
Chocolate Milk	8 oz. 1 cup	194	27	6	5	1 Skim Milk, 1 Bread, 1 Fat
Beer	12 oz.	170	16	0	0	1 Bread, 1 Fat
Coca Cola	6 oz. - 3/4 cup	78	20	0	0	2 Fruit
Seven-Up	6 oz. - 3/4 cup	72	18	0	0	2 Fruit
Lemonade	4 oz. - 1/2 cup	52	13	0	0	1 Bread
Carnation Instant (Breakfast made with Whole Milk)	8 oz. - 1 cup 1 Pkg.	298	35	16	12	2 Meat, 2 Bread 1 Fruit
Whiskey - 90 Proof	1½ oz.	120	0	0	17 gm ETOH	3 Fat

The Supplementary Exchange List is used with permission of the Central Ohio Diabetes Association, 1803 Fifth Ave., Columbus, OH 43212.

Appendix C

Table 10–8 Fast Food Exchanges

	NUTRITIONAL VALUES				EXCHANGES		
	CAL	CARB (Grams)	PRO (Grams)	FAT (Grams)	BREAD	MEAT (Medium)	FAT*
ARTHUR TREACHER'S							
(fish, chips, coleslaw)							
3-piece dinner	1100	91	38	65	6	4	9
2-piece dinner	905	83	28	51	5½	2½	8
BURGER CHEF							
Hamburger	250	23	12	12	1½	1	1½
Cheeseburger	304	24	14	17	1½	1½	2
Double Hamburger	325	28	20	15	2	2½	½
Double Cheeseburger	434	24	24	26	1½	3	2
Big Shef	535	41	25	30	2¾	3	3
Super Shef	600	39	29	37	2½	3½	4
Skipper's Treat	604	39	29	37	2½	3	4½
Rancher Platter	640	44	30	38	3	3½	4
Mariner Platter	680	85	32	24	5½	3	2
French fries	187	25	3	9	1½	—	2
Milkshake, Chocolate	310	48	9	9	3	½	1
BURGER KING							
Hamburger	310	30	16	14	2	1½	1½
Hamburger with cheese	360	31	19	18	2	2	1½
Double meat hamburger	440	32	26	23	2	3	1½
Double meat hamburger with cheese	540	33	31	32	2	4	2½
Whopper	650	51	27	37	3½	3	4½
Double Beef Whopper	850	54	44	52	3½	5	5½
Whopper with cheese	760	54	33	46	3½	3½	5½
Double Beef Whopper with cheese	970	55	50	61	3½	6	6
Whopper Jr.	360	31	15	20	2	1½	2½
Whopper Jr. with cheese	420	32	18	24	2	2	3
Whopper Jr. with double meat	490	32	25	29	2	3	3
Whopper Jr. double meat pattie with cheese	550	33	28	34	2	3½	3½
Whaler	660	54	28	37	3½	3	4½
Whaler with cheese	770	55	33	46	3½	3½	5½
Steak Sandwich	600	64	39	21	4	4½	—
Onion Rings	230	24	3	13	1½	—	2½
French Fries	240	28	3	12	2	—	2½
Milk Shake, Choc.	380	62	9	11	4	—	2
Milk Shake, Vanilla	360	55	9	11	3½	½	2
KENTUCKY FRIED CHICKEN							
(fried chicken, mashed potato, coleslaw, rolls)							
3-piece dinner							
Original	830	61	50	43	4	6	2½
Crispy	1070	74	54	62	5	6½	6
2-piece dinner							
Original	595	51	35	28	3½	4	1½
Crispy	665	40	37	40	2½	4½	3½

* At first glance, some fat exchanges may seem too low. Look at the meat calculation, the fat content may be included there.

From Midgley, W.: "Eating on the Fast Foot Trail,: *Diabetes Forecast*, July-August, 1979. Used with permission of the American Diabetes Association, Inc., © 1979, New York, NY.

Table 10-8 (continued)

	NUTRITIONAL VALUES				EXCHANGES		
	CAL	CARB (Grams)	PRO (Grams)	FAT (Grams)	BREAD	MEAT (Medium)	FAT
LONG JOHN SILVER							
(fish, chips, coleslaw)							
3-piece dinner	1190	100	55	63	7	6	7
2-piece dinner	955	89	38	50	6	3½	6
McDONALD'S							
Hamburger	260	31	14	9	1½	1	1½
Cheeseburger	306	31	16	13	2	2	1
Quarter Pounder	418	33	26	21	2	3	1
Quarter Pounder with cheese	518	34	31	29	2½	3½	2
Big Mac	550	44	21	32	3	2	4
Filet-O-Fish	402	34	15	23	2½	1½	3
French fries	211	26	3	11	2	—	2
Egg McMuffin	352	26	18	20	2	2	2
Pork Sausage	184	trace	9	17	—	1	2½
Scrambled Eggs	162	2	12	12	—	1½	1
Shake, Chocolate	364	60	11	9	4	½	1
PIZZA HUT							
(cheese pizza)							
individual							
thick crust	1030	143	71	19	9½	6	—
thin crust	1005	128	61	28	8½	6	—
½ of 13-inch							
thick crust	900	113	65	21	7½	6	—
thin crust	850	103	50	26	7	5	—
1 slice (⅛ of pie)	225	26	12½	6½	2	2	—
½ of 15-inch							
thick crust	1200	148	83	31	10	7	—
thin crust	1150	144	66	35	9½	7	—
SUBMARINE, HERO, GRINDER							
(8-inch sandwich)							
Italian cold cuts	620	60	36	26	4	4	1
Roast Beef	600	55	46	22	3½	5	—
Tuna	700	55	41	34	3½	5	2
TACO BELL							
Bean Burrito	343	48	11	12	3	1	2
Beef Burrito	466	37	30	21	2½	3½	½
Beefy Tostada	291	21	19	15	1½	2½	½
Bellbeeler	221	23	15	7	1½	2	—
Bellbeeler with cheese	278	23	19	12	1½	2	½
Burrito Supreme	457	43	21	22	3	2	2½
Combination Burrito	404	43	21	16	3	2	1
Enchirito	454	42	25	21	3	3	1½
Pintos 'n Cheese	168	21	11	5	1½	1	—
Taco	186	14	15	8	1	2	—
Tostada	179	25	9	6	2	1	—

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Some Abbrevations Used in the Nutrition in Primary Care Series

ATP	adenosine triphosphate
c	cup
cc	cubic centimeter
CNS	central nervous system
FDA	Food and Drug Administration
gm	gram
IBW	ideal body weight
IU	International Units
kcal	kilocalorie
kg	kilogram
lb	pound
lg	large
MCV	mean corpuscular volume
MDR	minimum daily requirement
med	medium
mEq	milliequivalent
mg	milligram
MJ	megajoule
ml	milliliter
oz	ounce
RDA	Recommended Dietary Allowances
RE	retinol equivalents
sl	slice
sm	small
Tbsp	Tablespoon
TPN	total parenteral nutrition
tsp	teaspoon
USDA	United States Department of Agriculture